

NIGERIA.

ANNUAL

MEDICAL AND SANITARY
REPORT

FOR THE YEAR

1926.

LAGOS:


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ANNUAL
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MEDICAL AND SANITARY REPORT ON NIGERIA FOR THE YEAR 1926.

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59 +
 14/7 +
 17/4 +
 19/1 +

- 18 First Class Dispensers.
- 57 Second Class Dispensers.
- 25 Dispensers-in-Training.
 - 1 Chief Storekeeper, Higher Division, Grade I.
 - 2 Assistant Chief Storekeepers, Higher Division Grade II.
 - 3 Storekeepers, Higher Division, Grade III.
 - 4 Second Class Storekeepers.
 - 2 Senior Wardens.
 - 4 Wardens.
 - 4 Assistant Wardens.
 - 5 Senior Nurses. (one appointment filled).
 - 16 Charge Nurses. (thirteen appointments filled).
 - 43 First Class Nurses.
 - 110 Second Class Nurses.
 - 133 Nurses-in-Training.
 - 1 Senior Laboratory Attendant (unfilled).
 - 3 First Class Laboratory Attendants (unfilled).
 - 5 Second Class Laboratory Attendants (three filled).
 - 10 Third Class Laboratory Attendants (five filled).
 - 1 Chief Attendant, Lunatic Asylum.
 - 24 Attendants Lunatic Asylum.

EUROPEAN STAFF.—SANITARY.

- 1 Deputy Director of Sanitary Service.
- 1 Assistant Director of Sanitary Service.
- 3 Senior Sanitary Officers (one seconded).
- 6 Medical Officers of Health.
- 24 Sanitary Inspectors (fifteen appointed, three vacancies and six unprovided for).

SPECIAL PLAGUE STAFF. (TEMPORARY).

- 1 Chief Plague Officer (Senior Sanitary Officer seconded).
- 4 R.A.M.C. Officers.
- 4 R.A.M.C. Non-commissioned Officers.
- 30 Rodent Inspectors.

AFRICAN STAFF.—SANITARY.

- 2 Chief Sanitary Inspectors (one vacancy and one unprovided for).
- 5 Senior Sanitary Inspectors (one appointed, two vacancies, two unprovided for).
- 10 First Class Sanitary Inspectors (five unprovided for).
- 46 Second Class Sanitary Inspectors (twenty-five appointed and twenty-one unprovided for).
- 20 Third Class Sanitary Inspectors.
- 64 Vaccinators.
 - 1 Registrar of Vital Statistics.
 - 1 Deputy Registrar of Vital Statistics.
 - 1 Clerk, Higher Division, Grade II.
 - 1 Clerk, Higher Division, Grade III.
 - 9 Clerks, Lower Division, Grades I and II (one vacancy).

- 2 Second Class Dispensers.
- 1 Charge Nurse.
- 4 First Class Nurses (four vacancies).
- 10 Second Class Nurses.

PRINCIPAL APPOINTMENTS, PROMOTIONS AND CHANGES DURING THE YEAR 1926.

The following European Officers retired on pension :—

MEDICAL STAFF.

- Dr. G. B. Norman, Assistant Director of Medical Service.
- „ J. J. Moore, Senior Medical Officer.
- „ C. W. McLeay, „ „ „
- „ H. R. Morehead, „ „ „
- „ E. J. Porteous, „ „ „
- „ J. C. Franklin, Medical Officer.
- „ A. H. Wilson, „ „
- „ J. H. McKay, „ „
- „ A. E. Neale, „ „
- „ E. L. Sieger, „ „
- Miss J. McCotter, M.B.E., Senior Nursing Sister.

SANITARY STAFF.

- Dr. H. A. Foy, Deputy Director of Sanitary Service.
- „ R. W. Orpen, Senior Sanitary Officer.

Four Medical Officers resigned and one was transferred to the Gold Coast. One Medical Officer of Health reverted to his original appointment of Medical Officer.

Dr. E. J. J. Quirk was promoted Senior Medical Officer, and transferred to Sierra Leone.

The following deaths, which are a serious loss to the Department, took place :—

- Dr. W. R. Parkinson, Specialist, from plague.
- „ G. Wilson, Senior Medical Officer, while on leave.
- Staff Sgt. F. G. Cannon, Sanitary Inspector, from yellow fever.

The following Officers were promoted during the year.

MEDICAL STAFF.

- Dr. T. L. Craig, Senior Medical Officer, to be Assistant Director of Medical Service.
- Dr. F. Ross, Medical Officer, to be Senior Medical Officer.
- „ L. H. Booth, „ „ „ „ „
- „ L. W. Davies, O.B.E., Medical Officer, to be Senior Medical Officer.
- „ A. J. M. Crichton, Medical Officer, to be Senior Medical Officer.
- „ J. W. Thomson, Medical Officer, to be Senior Medical Officer.
- „ H. Morrison, Medical Officer, to be Pathologist.

SANITARY STAFF.

- Dr. G. J. Pirie, from Gold Coast to be Deputy Director of Sanitary Service.
,, G. C. M. Davies, from Gold Coast to be Senior Sanitary Officer.
,, J. Macdonald, Medical Officer, to be Medical Officer of Health.
,, N. S. Turnbull, Medical Officer, to be Medical Officer of Health.

NEW APPOINTMENTS.

- 15 Medical Officers were appointed to the Staff during the year, of whom one joined the Sanitary Staff as Medical Officer of Health.
1 Assistant Bacteriologist.
1 Assistant Accountant.
1 Laboratory Attendant.
7 Sanitary Inspectors.

B.—LIST OF ORDINANCES, REGULATIONS, ETC., AFFECTING PUBLIC HEALTH ENACTED DURING THE YEAR.

ORDINANCE.

Serial No.	Date.	(a) Short Title and (b) Application.	
18/1926	27th May, 1926.	(a) Quarantine Ordinance. (b) Colony, Protectorate and British Cameroons.	

SUBSIDIARY LEGISLATION.

Serial No.	Date.	Ordinance made under.	Provision.
		ORDERS-IN-COUNCIL, 1926.	
14/1926	11th May, 1926.	Vaccination Ordinance.	Ordering vaccination of all adults and children at area known as Minna, Northern Provinces as necessary.
15/1926	„	Public Health Ordinance.	Ordering the application of the whole Ordinance, Rule 2/1917 and 12/1918 to area in Northern Provinces known as Township of Minna.
19/1926	31st May, 1926.	„	Ordering the application of the Ordinance and certain sub-rules of Rule No. 2/1917 to certain localities at Buea, Tiko, Bamenda, Kumba and Mamfe, British Cameroons.
21/1926	21st June, 1926.	„	As above with reference to Victoria, British Cameroons.
22/1926	28th June, 1926.	Births, Deaths and Burials Ordinance.	Ordering the registration of all births and deaths in the Township of Calabar from 1st September, 1926.
33/1926	6th Dec., 1926.	Public Health Ordinance.	Ordering particularly, application of Sections 17–21 of Ordinance to a definite area in Brass.
		REGULATIONS, 1926.	
26/1926	26th July, 1926.	Hospital Fees Ordinance.	Amending Regulation 2 of Regulations 24/1925. Detailing hospitals where fees for accommodation and maintenance are payable.
34/1926.	6th September.	Quarantine Ordinance.	Quarantine Regulations, 1926.
		RULES, 1926.	
7/1926.	15th June.	Townships Ordinance.	Non-keeping of pigs within Warri Township.
8/1926.	19th July.	Public Health Ordinance.	Amending Rule 22 of Rules No. 2/1917—protection of foodstuffs from rats, and storage, etc. of, in places where plague occurs.
11/1926.	23rd September.	Townships Ordinance.	Non-keeping of pigs within Forcados Township.
15/1926.	27th October.	„	As above with reference to Itu Township.
		ORDERS.	
32/1926.	23rd November.	Townships Ordinance.	Enngu Ngwo Urban District.

TABLE II.

C. FINANCIAL.

I.—Estimated Expenditure for the year 1926.

A.—PERSONAL EMOLUMENTS.

MEDICAL.

	£
Administrative Officers	11,100
Specialists	6,900
Senior Medical Officers	12,650
Medical Officers (European and African) ...	81,407
Dental Surgeon	933
European Nursing Staff	10,055
Clerical Staff	5,946
Dispensers and African Nursing Staff ...	32,018
Other items under Personal Emoluments ...	31,810
Total, Personal Emoluments ...	<u>£192,819</u>

SANITATION.

	£
Administrative Officers	2,800
Senior Sanitary Officers and Medical Officers of Health	7,835
European Sanitary Inspectors	6,750
African Sanitary Inspectors	9,407
Other items under Personal Emoluments ...	10,164
Total, Personal Emoluments ...	<u>£36,956</u>

MEDICAL RESEARCH INSTITUTE.

	£
European Staff	4,327
African Staff	361
Total, Personal Emoluments ...	<u>4,688</u>

B.—OTHER CHARGES.

Expenditure on Buildings, Medical and Sanitary	<u>£94,950</u>
--	----------------

MEDICAL.

	£
Medical, Surgical, Dental and X Ray Equipment and Supplies	20,250
Diets, Provisions and Necessaries	11,600
Other items	45,267
Total, Other Charges	<u>£77,117</u>

C.—SPECIAL EXPENDITURE.

	£
Tsetse Fly Investigation	10,000
Hospital Equipment	4,000
Total, Special Expenditure ...	<u>£14,000</u>

SANITATION.

					£
General Sanitary	...	...	...	...	21,976
Plague Expenses	...	...	...	...	30,000
Total, Other Charges					£51,976

MEDICAL RESEARCH INSTITUTE.

Miscellaneous, Other Charges	...	...			2,459
Total, Medical and Sanitary					
Expenditure	...	...			£474,965

II.—Estimated Receipts for the year 1926.

					£
Hospital and Medical Receipts	...	...			8,537
Births and Deaths	...	...	...		9
Total					£8,546

The total Medical and Sanitary expenditure for the year 1926 is £474,965 which is one-sixteenth of the estimated General Revenue for 1926-27—£7,788,670.

II.—PUBLIC HEALTH.

(a) GENERAL REMARKS.

General health has been satisfactory on the whole. There has been a notable absence of epidemics of relapsing fever, cerebro-spinal meningitis and smallpox with the exception of a moderate outbreak of relapsing fever in the Ondo Province and a limited epidemic of smallpox on the Plateau.

The general health of the European community was good on the whole; accurate figures are available only for European officials and these show a diminished death and invaliding rate with an increase in the number of officials resident. Comparative figures shown in tables.

Plague has continued to be epidemic in the town of Lagos and in the Province of Ijebu-Ode. Most of the cases were of the bubonic or septicaemic type but some cases of primary pneumonic plague occurred and the Medical Department lost Dr. W. R. Parkinson and two African nurses all infected from one case. Cases of yellow fever were reported during the year from Warri, Oshogbo and Lagos in the Southern Provinces. The Rockefeller Yellow Fever Commission now instituted at Yaba, Lagos, provided Noguchi protective vaccine and all Europeans who desired were vaccinated. The epidemic is described in detail under Preventive Medicine.

A party of Medical Officers under the auspices of the League of Nations visited Lagos in May. There were representatives from France, Belgium, Spain, Portugal, Latin America (Guatemala) South Africa and the British West African Dependencies.

(b) COMMUNICABLE DISEASES.

Malaria.—There is an increased number of cases among Europeans, 1,327 in 1926 as against 1,183 cases in 1925. The number of cases treated among Africans decreased to 19,067 in 1926, from 20,566 in 1925. Aestivo-autumnal type is the most common.

Blackwater Fever.—Twenty-eight cases among Europeans and four cases among Non-Europeans (one Syrian and three Africans), with eight deaths and one death respectively.

Of the European cases eight were officials and twenty were non-officials.

An analysis of twenty cases appears in the report of the Medical Research Institute. These figures are less than in 1925 although there is an increase in European population.

Yellow Fever.—There were eleven cases with seven deaths. Seven cases occurred in Lagos with five deaths, three at Oshogbo with two deaths and one at Warri which recovered.

Special reports on each case have been forwarded to the Secretary of State.

Trypanosomiasis.—Only one case reported in Europeans, a German infected in the British Cameroons and reported as cured, as against five in 1925. In Africans 298 cases with four deaths are reported as against seventy-four cases with sixteen deaths in 1925. The increase in the number treated is due to the activities of the Tsetse Investigation of which a report is included as an Appendix.

Relapsing Fever.—No cases reported among Europeans. There were 814 cases with 107 deaths treated among Africans. The cases treated represent only a small proportion of the cases which occur. Sporadic cases occurred in all the Northern Provinces except Bornu. It was epidemic in Sokoto in the first quarter of the year and 450 deaths were reported from the Benue Province in September. No cases were reported from the Eastern Province. The Central Province was infected with relapsing fever from the North in 1925, and it again appeared in epidemic form in Ado-Ekiti and Owo, towns in the Ondo Province. The Medical Officer in charge reported 615 cases with eighty-six deaths and the epidemic was finally stamped out.

Cerebro-Spinal Fever.—This disease was much less prevalent than in 1925. There was an epidemic in Kontagora from January-March, but only sporadic cases were reported from the other Provinces. The decrease in cases is more probably due to the cycle of the disease than to precautionary measures which can only be small in the large areas in which the disease appears in epidemic form. During 1926, 136 cases were treated in hospital with ninety-six deaths as against 131 cases with eighty-nine deaths in 1925. Two cases, both fatal, were reported from the Warri Province. No cases reported from the Eastern Medical Division.

Filariasis.—Filariasis in its various forms is common although treatment is sought for in cases of guinea-worm and elephantiasis chiefly. 1,860 cases of guinea-worm were treated as against 1,307 in 1925. One hundred and twenty cases of elephantiasis of the scrotum came to operation as against thirty cases in 1925. Loa-loa is common in Benin Province and certain parts of Calabar Province but the symptoms in Africans rarely call for treatment. One European was treated for this condition as against seven in 1925.

Dengue Fever.—Twelve cases were diagnosed and treated in 1926 as against five in 1925. All the cases were reported from the Northern Provinces.

Phlebotomous Fever.—Eight cases were treated in 1926, only one case reported in 1925. The cases were reported from Lokoja where sandflies at certain seasons are a great source of irritation.

(c) INFECTIOUS AND EPIDEMIC.

Plague.—There was a gradual increase in the number of plague cases during the year. 1,330 cases with 1,206 deaths were reported as against eighty-three cases with forty-nine deaths in 1925. A full report on plague in Lagos and the mainland is attached as an Appendix.

Influenza.—Influenza assumed epidemic form in the Onitsha Province where thirty-four Europeans and 357 Africans were treated for the disease with twelve deaths, and also on the Plateau where there were a large number of cases but a low mortality. The total cases returned were 230 in Europeans with no deaths and 1,892 among Africans with forty-six deaths as against 210 cases in Europeans with no deaths and 1,572 cases with four deaths among Africans in 1925.

Enteric Group.—Diseases of the enteric group have been reported for many years but have only been met with as sporadic cases.

Ten cases with three deaths were reported among Europeans and twelve cases with eight deaths among Africans as against eight cases with two deaths in Europeans and twenty cases with seven deaths among Africans in 1925.

Dysentery.—There is a decrease in the number of Europeans treated and an increase in the number of Africans treated. This increase among Africans does not indicate any change in the incidence of the treated but only that more cases are presenting themselves for treatment.

One hundred and fifteen cases with no deaths among Europeans and 3,009 cases with 126 deaths among Africans were reported as against 126 cases with no deaths among Europeans and 2,385 cases with 111 deaths among Africans reported in 1925.

Most of the cases are diagnosed as amoebic. Special attention has been given to the differential diagnosis of the various types of dysentery by the Pathologist, African Hospital, Lagos, who is of the opinion that bacillary dysentery is more common than has been reported in previous years (*see* Appendix VI).

Smallpox.—Smallpox is becoming less common in the Southern Provinces where vaccination is compulsory and is constantly carried out. Epidemics were reported from Ede and Ogbomosho in the south and from Kano, Zaria and Eastern Railway Construction in the Northern Provinces where vaccination is not compulsory.

The total returns for the year are as follows:—

	1926.	1925.
Vaccinated	369,576	330,826
Inspected	299,073	268,091
Percentage successful of those inspected	76.9	85.7

Syphilis.—Syphilis is reported to be increasing in parts of the Northern Provinces but not in the Southern Provinces. The differential diagnosis between syphilis and yaws is very difficult owing to their similarity and to the efficacy of the arsenical preparations in the treatment of both syphilis and yaws.

In the minds of a certain proportion of the lay community all large ulcers, which are very common, are syphilitic and this gives rise to reports of the prevalence of syphilis which are incorrect. The absence of para-syphilitic diseases is noted from all the Medical Divisions. This is possibly connected with the prevalence of malaria which is now used in the treatment of certain post-syphilitic diseases.

During 1926, sixty-two cases among Europeans were reported and 3,949 with twenty-nine deaths among Africans as against twenty-eight cases among Europeans and 2,135 cases with fifteen deaths among Africans in 1925.

Yaws.—Yaws is widespread and now that the efficacy of treatment by arsenical preparations is becoming known the number being treated is largely increased with a proportionate increase in expense as the drugs used are costly.

During 1926, 7,879 cases with four deaths were treated as against 2,024 cases with no deaths in 1925.

Leprosy is very prevalent particularly in the Benin, Kwale, Asaba and Onitsha Districts. It is gratifying to observe that patients in the early stages have begun to attend for treatment voluntarily. Voluntary segregation settlements have been opened.

in several of the Northern Provinces and the patients get regular treatment. A large number of patients have come under treatment at Port Harcourt and good work is being done by Drs. Barudon and MacDonald, Medical Missionaries at Vom in the Northern Provinces and at Itu in the Southern Provinces respectively.

A visit of inspection was made by Mr. F. Oldrieve, Secretary of the Empire Leprosy Relief Association and considerable interest aroused especially in Lagos. A Nigerian Branch of the Association has been formed under the Presidency of His Excellency Sir Graeme Thomson, K.C.B. The appointment of a Medical Secretary has been approved and will make for the co-ordination of effort and greater activity in treatment.

1,638 cases with nineteen deaths were treated in 1926 as against 1,317 cases with thirty-two deaths in 1925.

Tuberculosis.—Tuberculosis, chiefly pulmonary, is increasing throughout Nigeria.

During 1926, 785 cases with 124 deaths were treated as against 396 cases with seventy-nine deaths in 1925.

(d) HELMINTHIC DISEASES.

Ankylostomiasis.—Ankylostomiasis is widespread and causes a certain amount of disability through anaemia and other sequelae. Six hundred and seventy-two cases were treated with fifteen deaths in 1926, as against 1,196 cases with seventeen deaths in 1925.

Cestoda.—Tapeworm is chiefly found in the Northern Provinces, 3,338 cases were treated with one death in 1926, as against 3,128 cases with no deaths in 1925.

Dracunculus is common in all districts where water is obtained from holes or stagnant pools. It is uncommon, excepting imported cases, where the water supply is taken from a running stream. 1,860 cases with one death were treated in 1926 against 1,307 cases with one death in 1925.

(e) VITAL STATISTICS.

Estimated population for Nigeria and British Cameroons 18,502,322.

1.—GENERAL AFRICAN POPULATION.

There are no statistics of value for the general African population. The health owing to the comparative absence of large epidemics, was probably better than in previous years.

The following table gives a summary of Vital Statistics for Lagos and Ebute Metta. Registration is only compulsory in Lagos and Ebute Metta.

	1926.		
	Lagos.	Ebute Metta.	Total.
Estimated Population (Lagos and Ebute Metta)	—	—	111,000
Total Births	2,730	598	3,328
Birth Rate per 1,000 Population	—	—	29·9
Total Deaths	2,552	480	3,032
Death Rate per 1,000 Population	—	—	27·3
Deaths—Causation of—Certified by Medical Practitioners—number	2,098	92	2,190
Deaths—Causation of—Certified by Medical Practitioners—per cent.	82·2%	19%	72·2
Deaths—Infants under one year	524	138	662
Infantile Mortality per 1,000 births	191·9	230	198
Deaths under one year Certified by Medical Practitioners—number	292	13	305
Deaths under one year Certified by Medical Practitioners—per cent.	11·4	9·4%	10·05
Deaths—Children under 5 years	762	189	951
Percentage of deaths of Children under 5 years to total deaths	29·8	39·3%	31·3
Total Stillbirths	111	33	144
Stillbirths—proportion per cent of the total Births (Normal and Stillbirths)	3·9	5·2%	4·1
Deaths uncertified by Medical Practitioners—number	454	388	842
Deaths uncertified by Medical Practitioners—per cent.	17·7	80%	27·7

2.—GENERAL EUROPEAN POPULATION.

Statistics so far are incomplete and do not admit of sick, invaliding and death rates being completed. The invalidings recorded in Government returns are anaemia two, influenza one, chronic nephritis one, neurasthenia five, insanity one, cellulitis foot one, tuberculosis six, yellow fever one, mastoiditis one, neuritis five, pleurisy two, gonorrhoea one, arthritis one, renal calculus one, carcinoma stomach one, adenitis two, dyspepsia one, dysentery amoebic seven, conjunctivitis one, blackwater fever three, alcoholism four, malaria six, cachexia one, pneumonia two, abscess of lung one, abortion one, appendicitis one, orchitis one, sunstroke one, injury one, duodenal ulcer three, gastric ulcer two. The deaths among the European population as furnished by the Registrar are septicaemia one, tetanus one, blackwater six, sun trauma one, heart disease two, tuberculosis two, malaria three, chronic nephritis two, yellow fever six, drowning two, paratyphoid one.

Estimated European Non-Official Population	2,423.
Invalidings recorded	68
Deaths	27

3.—EUROPEAN OFFICIAL POPULATION.

The invalidings and deaths are less than in 1925.

INVALIDINGS, 1926.

Leave conditions.	Under 6 months.	Under 9 months.	Under 12 months.	Under 15 months.	Under 18 months.	Over 18 months.	Total.	Strength of European Government Officers.
New Regulation	3	12	16	24	23	2	80	1,589
Old Regulation	9	6	3	1	-	1	20	533
Total ...	12	18	19	25	23	3	100	2,122

TABLE SHOWING SICK, INVALIDING AND DEATH RATES,
EUROPEAN OFFICIALS.

Total number resident	2,526
Average number resident	1,776
Total number on sick list	1,587
Total number of days on sick list	15,487
Average daily sick	42.43
Percentage of daily sick to average number resident	2.38
Average number of days on sick list to each patient	9.76
Average sick time to each resident	8.72
Total number invalided	100
Percentage of invalided to number resident	3.96
Percentage of invalided to average number resident	5.63
Total number of deaths	15
Percentage of deaths to number resident	.59
Percentage of deaths to average number resident	.84

Not included in above invaliding figures are sixty-seven officers whose health was such that they were recommended to see the Medical Adviser to the Colonial Office.

Seven of these had not completed their tour.

SUMMARY OF INVALIDINGS AND DEATHS, 1926.

No.	Disease.	Invaliding.	Deaths.
5c	Malaria A.A.	9	1
5e	Blackwater Fever	4	3
16a	Dysentery Amœbic	2	—
17b	Plague Pneumonic	—	1
18	Yellow Fever	1	1
21	Erysipelas	1	—
28	Rabies	—	—
31	Tuberculosis Pulmonary	2	—
41	Septicæmia	1	—
51	Acute Rheumatism	1	—
58b	Anæmia	12	—
66	Alcoholism	1	—
70	Encephalitis... ..	—	1
77	Delusional Insanity	2	—
82b	Neuritis	2	—
82c	Neurasthenia	25	—
84	Other affections—nervous system	2	—
86	Diseases of the ear	1	—
88	Endocarditis	1	—
90a	Valvular diseases of heart	1	—
90b	Myocarditis	2	—
—	Other diseases of heart	2	—
91b	Arterio-Sclerosis	1	—
92	Embolism or Thrombosis	—	2
94b	Lymphadenitis	1	—
97c	Rhinitis	1	—
99	Bronchitis	1	—
101a	Pneumonia	—	1
102	Pleurisy	1	—
108b	Ulcer of mouth	1	—
109a	Tonsillitis	1	—
112a	Gastritis	2	—
112b	Other affections of the stomach	3	—
114	Diarrhœa and enteritis	2	—
117	Appendicitis	2	2
122	Cirrhosis of Liver	1	—
124a	Abscess of Liver	1	—
124d	Jaundice	2	—
131	Pyonephrosis	1	—
133	Diseases of the bladder	1	—
157b	Synovitis	2	—
170	Suicide by fire-arms	—	1
175	Food Poisoning	1	—
189	Injuries inflicted by kicks, bites, etc. ..	2	—
194a	Heatstroke	1	—
197	Murder by fire-arms	—	1
201c	Fracture (Skull)	—	1
		100	15

4.—AFRICAN OFFICIAL POPULATION.

The health of African officials has improved compared with 1925. The total number resident increased from 3,020 to 3,457 in 1926 and the average daily sick decreased from 73.6 in 1925 to 50.3 in 1926.

Total number of deaths were twenty-eight in 1926 as against thirty-nine in 1925 with a smaller number resident.

TABLE SHOWING SICK, INVALIDING AND DEATH RATE,
AFRICAN OFFICIALS.

	1924.	1925.	1926.
Total number resident	3,195	3,020	3,457
Average number resident	3,104	2,790	3,169
Total number on sick list	3,536	3,156	2,993
Total number of days on sick list	25,680	26,881	18,389
Average daily sick	70·36	73·6	50·3
Percentage of daily sick to average number resident ...	2·2	2·6	1·5
Average number of days to each patient	7·3	8·5	6·1
Average sick time to each resident	8·03	8·9	5·3
Total number invalided	13	41	52
Percentage of invalided to number resident	·40	1·35	1·5
Percentage of invalided to average number resident ...	·419	1·47	1·6
Total deaths	11	39	28
Percentage of deaths to number resident... ..	·344	1·29	·80
Percentage of deaths to average number resident ...	·351	1·39	·88

The causes of invaliding of African officials were hemiplegia three, blindness three, paraplegia one, compound dislocation of ankle joint one, neurosis one, myocarditis six, mitral incompetence two, cataract double three, leprosy one, general debility four, tuberculosis of the lungs five, chronic bronchitis one, nervous shock one, hallucination of persecution one, cirrhosis of the liver one, haemorrhoids and anaemia one, chronic nephritis two, tuberculous adenitis one, chronic valvular disease of the heart one, muscular tremors with clonus one, endocarditis two, deafness one, aortic and mitral regurgitation one, syphilis one, arterio sclerosis one, chronic rheumatism one, trypanosomiasis one, melancholia one, accident one, ill-defined two.

The causes of deaths were broncho pneumonia one, pneumonia four, arterio sclerosis one, cerebral abscess one, smallpox one, colitis and marasmus one, dysentery one, myocarditis one, pneumonic plague three, kidney troubles one, pyrexia one, inflammation of scrotum and gangrene one, dementia one, gastro enteritis one, unknown one, bubonic plague six, lymphatic leukaemia one, cerebro-spinal fever one.

5.—SOLDIERS—NIGERIA REGIMENT, W.A.F.F.

The following figures show the health of the rank and file of West African Frontier Force for 1926.

Average daily strength	3,177
Total number on sick list	3,253
Total number of days on sick list	25,090
Average daily sick	68
Total number of deaths	29
Death rate per thousand	9.1

6.—POLICE FORCE.

The following figures show the health of the rank and file of the Police Force for 1926. There is an increase in the number on the sick list and death rate per thousand although the average daily strength is not increased.

	Northern Provinces.	Southern Provinces.
Average daily strength	1,227	2,043
Total number on sick list	612	2,151
Total number of days on sick list	6,231	9,964
Average daily sick	17	27
Total number of deaths	20	17
Death rate per thousand	16.3	13.2

III.—SANITATION.

A.—GENERAL REVIEW OF THE WORK DONE AND PROGRESS MADE.

I.—PREVENTIVE MEASURES.

(1) MOSQUITO AND INSECT-BORNE DISEASES.

(a) *Malaria* is still the most prevalent of the tropical infections. It is responsible for a considerable number of infant and child deaths amongst Africans. The majority of adult Europeans take quinine as a prophylactic measure. The usual custom is to take five grains quinine daily.

The general sanitary measures carried out in a routine way in all stations where Government Sanitary Staff are provided, include close attention to detecting and eliminating all conditions favourable to the breeding of mosquitos. The common practice amongst Africans is to store water in their houses in clay or metal receptacles but fortunately the mosquito carriers of malaria prefer to breed in natural waters such as swamps or the marginal pools and still waters of slow running streams. Pools formed on the surface of the ground due to the rising of the ground water during the rainy season are favourite breeding places and require continual attention and oiling by the Sanitary Staff.

The Medical Officer of Health in his Annual Report on Lagos 1926, states that anophelines were found breeding in pools, crab holes, tree holes, crab traps and also in domestic utensils and catch-pits and adds that the special investigations carried out by Major Dunn of the Rockefeller Yellow Fever Commission were of great value in indicating breeding grounds.

(b) *Trypanosomiasis*.—Special work with regard to areas infected with trypanosomiasis and infested with tsetse fly is being carried out by a commission of officers of the Medical Branch of the Department. The Headquarters of the Commission is at Sherifuri in the Northern Provinces.

(c) *Yellow Fever*.—During the year eleven cases occurred amongst Europeans, seven of which proved fatal. The majority were persons in their first or second tours of service in Nigeria.

DISTRIBUTION OF THE CASES.

Warri.—In April one case occurred in a European at Warri. This case recovered.

Oshogbo.—In June and July three cases occurred. The first case occurred at Oshogbo, a town on the railway north of Ibadan. This case ended fatally. The second case was diagnosed in a European at Lagos four days after sleeping in the same house at Oshogbo in which the first case occurred. This case recovered. The third case, a Roman Catholic Father, took ill and died at Warri. This case had visited Oshogbo within three days of the onset of his illness, and was in all probability infected there.

Lagos.—Three groups of cases occurred in Lagos.

First Group.—Three cases occurred at the end of July. Two were Government officials, one of whom died. The third case was the wife of the manager of an Hotel in Broad Street. This case was fatal. It is almost certain that all

the cases in this group were infected at this Hotel. The Hotel is situated in Broad Street which runs parallel to and not far from the Marina in a densely populated part of Lagos.

Since the end of the year, but before this report was completed, the manager of this Hotel contracted yellow fever and died.

Second Group.—There was only one case in this group; a European who had been living on a vessel which had been refitting for four months at the Dry Dock in Lagos Harbour. This case recovered.

Third Group.—Three cases occurred in November, and all died. The first of this group was a Marine Engineer of English nationality who was employed on small steamers engaged in the coastal and local trade. When on shore he lived in a bungalow near the floating dock.

The second case was also English and was a Motor Mechanic who was employed at his quarters 13, Porto Novo Market Street, Lagos. He had been twelve months in the country. The third case was a woman missionary who was English and had been only five weeks in the country. She probably was infected at premises in Broad Street, Lagos.

PARTICULARS OF THE REPORTED CASES.

No. of Case.	Date of onset of Disease.	Place where case occurred.	Nationality of patient.	Age.	Length of Residence in West Africa.	Result.	Remarks.
1	April 12	Warri ...	Irish ...	29 years	15 months	Recovery ...	—
2	June 22	Oshogbo	British ...	31 "	5 years	Died ...	Removed from Oshogbo to Ibadan Hospital.
3	July 4 (?)	" ...	English ...	30 "	2 "	Recovery ...	From same house as No. 2 diagnosed and treated at Lagos Hospital.
4	" 15	Benin City	British ...	29 "	18 months	Died ...	At Oshogbo from 10th to 12th July.
5	" 19	Lagos ...	English ...	39 "	13 "	" ...	—
6	" 28	" ...	" ...	32 "	6 years	Recovery ...	—
7	" 29	" ...	" ...	43 "	8 months	Died ...	—
8	Sept. 16	" ...	" ...	44 "	2 years	Recovery ...	From S.S. <i>Sir George</i> at Wilmot Point.
9	Nov. 7	" ...	" ...	57 "	Many "	Died ...	From S.S. <i>Fantiman</i> at Wilmot Point.
10	" 13	" ...	" ...	32 "	12 months	" ...	—
11	" 22	" ...	" ...	29 "	5 weeks	" ...	—

The diagnosis of yellow fever was confirmed by post-mortem examination in all the fatal cases. The Rockefeller Commission kept in close touch with the various outbreaks and practically every case was seen by one of the members of that Commission.

Preventive Measures.—Vaccination with Noguchi vaccine was offered free to any European who desired to have it and intensive anti-mosquito work, fumigation of premises and observation of contacts was carried out. All the cases reported occurred in Europeans living among African communities. No cases occurred in European residential areas. This was also the experience in the Gold Coast where during the considerable outbreaks which

occurred in 1922-23 none of the Europeans infected contracted the disease in residential areas. In Lagos residence near Africans and particularly in the vicinity of the harbour or on vessels in the harbour increases the risk of infection. The risk run by Europeans living on craft in the harbour or in residence near the harbour has been particularly noticeable in the recent outbreaks in Lagos. All harbour craft are now regularly inspected and disinfected by the Port Medical Officer and his staff. The work of disinfecting these craft will be greatly facilitated when the new Clayton Disinfector Barge arrives from England. It is expected early in 1927.

Much has yet to be learned with regard to the epidemiology of yellow fever in West Africa. If the source of infection be the African, as in all probability it is, the great difficulty in recognising the disease in the African limits the preventive measures mainly to destruction of the *Stegomyia* mosquito. In a country where the people have to store water in their houses the complete elimination of *Stegomyia* is impossible. A great deal can be done, and is being done, by energetic anti-mosquito measures to keep down the *Stegomyia* prevalence. In Lagos there are still large numbers of non-immunes resident in the African part of Lagos Town.

In none of the cases of yellow fever has the *Leptospira icteroides* been discovered.

TABLE SHOWING INCIDENCE OF YELLOW FEVER IN NIGERIA
FROM 1914-1926.

1914	—	One fatal case at Jebba.
1915	—	One fatal case at Kaduna.
1916	—	One fatal case at Lagos.
1917	—	Four cases were reported in the Southern Provinces and several were stated to have occurred along the River Benue.
1918	—	Two cases at Forcados and Benin.
1919	—	One fatal case at Warri.
1920	—	One fatal case at Lagos.
1921	—	—
1922	—	Two cases at Warri.
1923	—	None reported.
1924	—	Three isolated cases.
1925	—	Twenty-one cases.
1926	—	Eleven cases.

NOTE ON THE USE OF NOGUCHI CURATIVE SERUM DURING 1925
AND 1926.

The table below gives the year, the day of illness when the serum was given, the dose given, and the result of the illness.

Year.	Case.	Day of illness.	Dose.			Result.
1925	1	3rd	Two doses of 25 c.c. each	...	...	recovered.
"	2	{ 3rd 4th	Two doses 35 and 15 c.c. One dose 25 c.c.	...	...	{ Died.
1926	3	3rd	Two doses of 25 c.c. each	...	...	Died.
"	4	{ 4th 5th	One dose of 25 c.c. Two doses of 25 c.c. each	...	...	{ Died.
"	5	{ 2nd 3rd	One dose of 25 c.c. Two doses of 25 c.c. each	...	...	{ Died.

There were no adverse reactions after the injections, but no opinion as to the value of the serum for curative purposes can be based on such a small number of cases. During the year outbreaks of yellow fever were reported from the following places in West Africa :—

From the Gold Coast, cases were reported as having occurred at Accra, Nsawam, Asamangkese, Saltpond, Cape Coast and Axim.

From Senegal (French) at Diourbel, Rufisque, Casamanka.

From Dahomey at Port Novo.

The Yellow Fever Commission of the Rockefeller Foundation has investigated all the cases of yellow fever and their work and co-operation has been of great assistance to the Department. Vaccine and serum has been supplied free by the Commission not only to Nigeria but to other colonies and Governments in West Africa.

(*d*) *Filariasis*.—No approximately accurate statistics of the prevalence of filariasis are available. Loaloa and *Filaria bancrofti* are very prevalent in the eastern section of the Southern Provinces.

(2)—EPIDEMIC DISEASES.

(*a*) *Plague*.—A full report on plague in Nigeria during 1926 by the Senior Sanitary Officer in charge of the anti-plague work is attached as an Appendix to this report.

During the year there was a gradual increase in the number of cases of plague both in Lagos and on the mainland.

The chief centre on the mainland was Ijebu-Ode but numerous cases were reported from other towns in the Ijebu-Ode Province. A few cases were reported from Abeokuta. The infection in rats both in Lagos and on the mainland showed a corresponding increase.

Altogether during the year 497 cases of plague were notified in Lagos and of these 476 died.

In Ijebu-Ode 833 cases were reported and of these 727 died. This gives a total of 1,330 cases of plague with 1,203 deaths.

The majority of the cases were of the bubonic and septicaemic types but cases of the primary pneumonic variety also occurred.

The infectivity of the primary pneumonic variety was intense as was seen when Dr. Parkinson, the Surgical Specialist, and two African nurses acquired fatal infections from one case which was admitted to the African Hospital as an ordinary pneumonia.

Owing to the danger of mistaking primary pneumonic plague for ordinary pneumonia, pneumonia was made a notifiable disease in August, 1926.

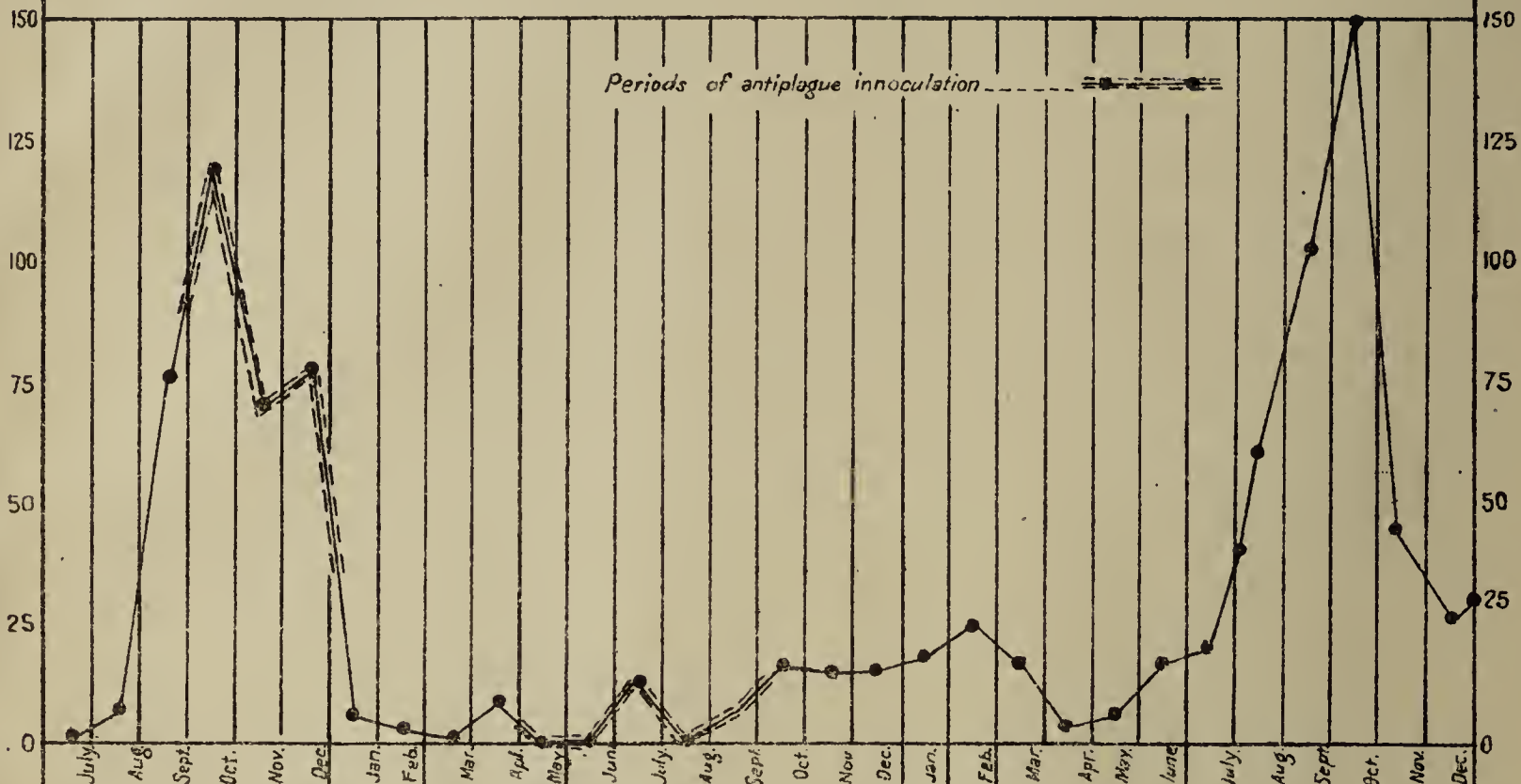
The anti-plague measures being carried out are based on the Report on Plague in Nigeria by Colonel Sir Edward N. Thornton, K.B.E., M.R.C.S. (Eng.), L.R.C.P. (Lond.), D.P.H. (Camb.), S.A.M.C., who at the request of the Government visited Nigeria in June and July to examine into the increase of plague and to report on the most effective methods of dealing with it

DEATHS FROM PLAGUE

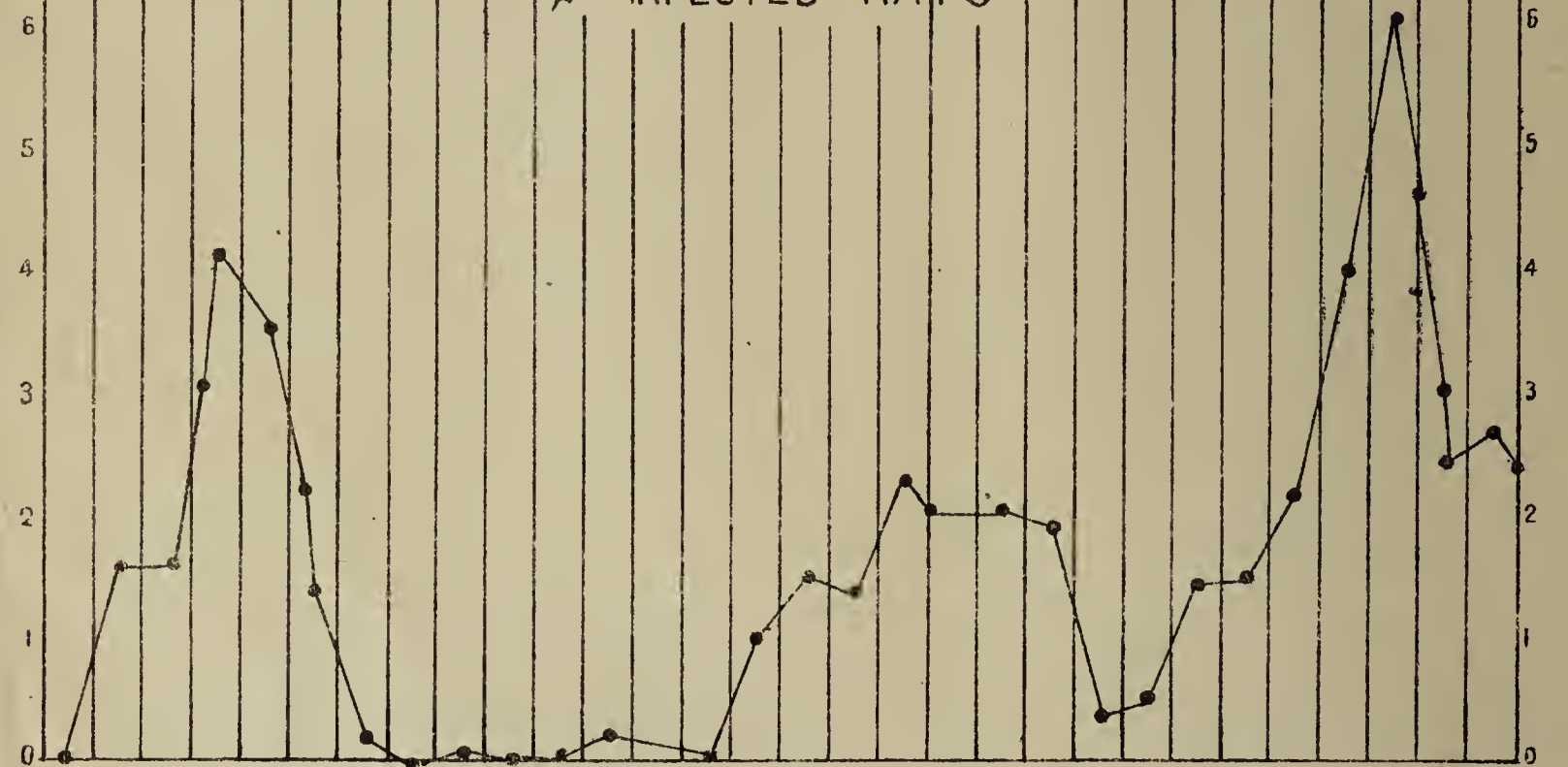
1924

1925

1926



% INFECTED RATS



His report was submitted in July, 1926, and the special staff required for carrying out the anti-rat campaign advocated by Sir E. N. Thornton arrived in November and December, 1926. The special staff consisted of two R.A.M.C. Majors, two R.A.M.C. Captains and thirty R.A.M.C. Non-Commissioned Officers and Privates and they are on duty in Lagos and on the mainland.

The campaign directed against the rat began early in December and covers only the last month of the period dealt with in this report.

The sanitary problems presented in Lagos are the most difficult in West Africa, and they all arise from one cause namely gross human congestion. Excluding Ikoyi and the southern Marina the western half of that part of the Island of Lagos between the MacGregor Canal and Carter Bridge is in reality one huge market, and in that market seventy to eighty thousand African people live. Sanitary effort as ordinarily applied, is quite helpless in face of the difficulties presented. Lagos, without doubt, could be made safe against plague if all rats could be destroyed but this is quite impossible under the conditions existing in the greater part of Lagos Island. The most important recommendation made by Sir E. N. Thornton is the Town Planning of Lagos, as only by such means can the gross human congestion which is the real problem in Lagos, be dealt with effectively.

Mr. Thomson, the Town Planner recommended by Sir E. N. Thornton, is expected to arrive early in January, 1927. A chart is given below which shows how closely during the years 1924-1925 and 1926, plague in human beings followed the rat infection.

During the year plague was reported from the following places outside Nigeria :—

Las Palmas, Benguella in Portuguese Guinea, Santa Cruz, Senegal, Azores.

Smallpox.—There has been no very severe epidemic of smallpox during the year. The disease is, however, always present particularly during the first six months of the year. Outbreaks each of more than forty cases were reported from Ede, Ogbomosho, Ejigbo, Ikirun in the Southern Provinces, from Kano, Zaria, Eastern Railway Construction and Yasdukka in the Northern Provinces. In the Southern Provinces vaccination is compulsory while in the Northern Provinces vaccination is not compulsory except in areas which, when necessary, have been declared "Prescribed Areas" under Section 6 of the Vaccination Ordinance. In remote parts of the country where Europeans seldom visit, smallpox may be kept alive by the native practice of inoculation. The inoculation is ordinarily made on the back of the wrist from vesicle content from an actual case of smallpox which has occurred in the village. The mortality from inoculated smallpox is low, and in many cases the illness is not so severe as to keep the sufferers at home, and in this way the disease is rapidly spread over considerable areas.

Inoculation is prohibited under the Vaccination Ordinance but it is extremely difficult to enforce this in remote parts of the country.

For vaccination lanolinated lymph prepared by the Lister Institute is used.

VACCINATIONS.

SOUTHERN PROVINCES.

	1924.	1925.	1926.
Total vaccinated ...	237,133	285,763	330,209
Number inspected ...	185,146	236,614	273,792
Number successful ...	131,162	186,561	216,610
Percentage successful of those inspected ...	70%	78%	75.4%

NORTHERN PROVINCES.

	1924.	1925.	1926.
Total vaccinated ...	34,617	45,063	39,367
Number inspected ...	26,177	31,477	25,281
Number successful ...	17,542	26,267	20,109
Percentage successful of those inspected ...	67%	83.4%	79.5%

Cholera.—This disease has not yet been reported in Nigeria.

Dysentery is prevalent all over the country but particularly in Northern Provinces. One hundred and forty-six cases were reported from Kano probably due to the unsatisfactory water supply from wells.

One hundred and ninety-nine cases with fifteen deaths were reported from Northern Provinces.

Fewer cases were reported from the Southern Provinces. The incidence of the disease is at its maximum from April to August during the rainy season.

No figures are available to discriminate between amoebic and bacillary dysentery.

Enteric.—Three cases were reported in Southern Provinces. One at Ibadan, one at Benin and one at Victoria in the Cameroon Mandated Territory.

Tuberculosis.—In Lagos during the year 125 deaths were registered as due to tuberculosis, and 102 of these were recorded as pulmonary tuberculosis.

The following table gives the deaths in Lagos medically certified as due to tuberculosis from years 1922 to 1926.

TUBERCULOSIS IN LAGOS (CERTIFIED DEATHS).

	1922.	1923.	1924.	1925.	1926.
Pulmonary Tuberculosis ...	74	85	69	72	82
Tuberculosis, other parts...	4	6	23	10	23
Total ...	78	91	92	82	105

Relapsing Fever.—There was no very serious outbreak of this disease during the year. The outbreak which occurred in Arigidi in Ondo Province, Southern Provinces, Nigeria, last year has since spread to Ado-Ekiti and many other villages in that area. Preventive measures were instituted and the nature of the disease and its mode of transmission were explained to the Chiefs and other people. Active treatment was undertaken with arsenical com-

pounds. Great difficulty was found in treatment owing to the passive resistance of the natives who refused to come up for treatment till curative measures were hopeless. The disease is associated with dirt and lousiness. Towards the end of the year the cases reported from Ondo Province showed a steady decline.

Cerebro-spinal Fever.—The actual number of cases of this disease during the year is not known but 673 deaths were reported from the Northern Provinces. The provinces chiefly affected were Niger, Munshi and Yola Provinces. Sporadic cases occurred in Sokoto, Kaba, Ilorin Provinces. Ten deaths were reported from Kaduna. The principal factors in the spread of the disease are overcrowding and direct infection from carriers. Wind-borne infection is probably negligible.

(3).—HELMINTHIC DISEASES.

Ankylostomiasis and Taeniasis.—Some years ago an investigation was made as to the prevalence of intestinal entozoa in Africans in Zungeru and Lokoja. The investigation was mainly confined to convicts in the prisons. Four hundred Africans were examined and of these 61.2% were found to be infected with intestinal parasites. In 42% ankylostomes were found and in 17.5% cestodes were found.

In this investigation most of the individuals examined belonged to tribes of the Northern Provinces, and they showed a higher percentage of infection than was found in those who were natives of Southern Provinces. In the case of cestode infection this was accounted for by difference in food habits, as most of the natives of Southern Provinces examined in Lokoja and Zungeru belonged to the more educated clerical class. This year at the clinical laboratory in Port Harcourt in Southern Provinces the Medical Officer examined material sent from the Hospital Out-patient and In-patient Departments, the Prison and from post-mortems and he reports ankylostome infections were found in 53% and taenia in 1.8% of the cases examined. The same Medical Officer in his report on the Prisons at Port Harcourt states that 59% were infected with ankylostomes and adds that “the majority of the ankylostome-infected prisoners showed little or no physical signs of the disease and appeared physically fit.”

The Senior Sanitary Officer in his Annual Sanitary Report for the Northern Provinces states that all pupils at the Training College at Katsina are treated every six months for hook worm and the boys at the Provincial School have all received a course of treatment.

He adds that the infestation with hook worm is common but seems to give rise to little, if any, disability and ill-health.

It is now generally accepted that ankylostome infection is very common among the natives of Nigeria and no doubt renders those infected more liable to other diseases particularly intestinal affections.

Definite ankylostome anaemia is, however, not common. It will nevertheless require to be recognised that where Africans are employed in numbers as in mines and plantations, it is very necessary to provide latrines of a correct type and supervision of an efficient nature, as there will be considerable risk of the usually small ankylostome infections becoming much greater and definite ankylostome anaemias supervening.

Guinea-worm is very prevalent in the drier parts of the Northern Provinces particularly in Bornu.

When the guinea-worm comes to the surface the native seizes the end and winds it on a small flat piece of stick. Every day he winds it a little more and in this way he hopes ultimately to remove the whole guinea-worm.

Many of the ulcers and chronic septic conditions of the lower limbs owe their origin to the worm being broken in attempting removal by this method.

II.—GENERAL MEASURES OF SANITATION.

The general methods of sewage disposal in Nigeria are simple and primitive. In all the small farming villages, the surrounding bush is the public latrine. In the larger towns under Native Administration control, the cesspit (Hausa Salga) is in general use. Both the above methods of sewage disposal facilitate fly breeding. In the towns or townships under European control the cesspit (Hausa Salga) or the pail system is in vogue. The pail system is expensive, and it is rare to find a public pail latrine that is not in itself a nuisance, and this is entirely due to the inability of many to use the latrine correctly. The water flush system of sewage disposal has not yet appeared in Nigeria.

In June of the year under review an investigation was carried out by Mr. Humphreys of Howard Humphreys & Sons with the object of preparing a preliminary report and estimate for the main sewage of the city. This report was submitted in November.

The experimental septic tank water closet at Port Harcourt referred to in the Annual Medical and Sanitary Report, 1925, has not yet matured.

Scavenging in towns under European control is carried out by a Public Authority. In the Northern and Southern Provinces where towns are under a Native Administration, the Native Administration undertakes a certain amount of scavenging.

Refuse is dealt with either by burning or burial. To deal more effectively with the refuse in Lagos a large destructor has been ordered from England. The material for its construction is expected to arrive in 1927.

Drainage.—In the great majority of townships, the drainage is by surface drains either earth drains or concrete drains.

A treated pipe-borne water supply is provided in Lagos. An untreated pipe-borne but partial water supply is provided in Abeokuta, Kaduna and Calabar. Enugu has a good untreated water supply.

At Kaduna water is pumped from the Kaduna River and pipe-borne to the European compounds, the African clerks' quarters and the African town. Condensed water is supplied to Europeans for drinking purposes. The Public Works Department has started the new water supply works.

Lokoja has a pipe-borne water supply from spring on Mount Patti to standpipes in the European area. At Minna water is pumped from the River Bako and is laid on to all European compounds for washing purposes. Condensed water is provided to Europeans for drinking. The usual water supplied for native communities is obtained from wells or streams or rivers.

The common offensive trade in Nigeria is hide curing. This industry is mainly confined to the Northern Provinces. At Apapa (Lagos) there is a soap factory.

Certain trades have been declared offensive trades and full powers of control are provided in the Lagos Regulation of Offensive Trades Bye-laws, 1924.

Clearance of bush and undergrowth is carried out as a routine measure in most Government Stations. A considerable amount of bush clearing has been done at Apapa. Since the wharves at Apapa were completed the amount of shipping and trade there has greatly increased, with a consequent increase in the population in the Apapa Area.

In practically all Government stations African Sanitary Inspectors or Sub-Inspectors are stationed. They carry out the general duties of an inspector of nuisances. To some of the larger Government stations European Sanitary Inspectors are posted. All Sanitary Inspectors are responsible to the Medical Officer of Health, or Medical Officer where there is no Medical Officer of Health.

The Public Health Ordinance only applies to towns which have been declared townships under the Townships Ordinance. In towns under Native Administration a certain amount of sanitary supervision is exercised by the Native Administration particularly in the larger towns.

III.—SCHOOL HYGIENE.

There is no routine medical inspection of school children in Nigeria. There is room for improvement in the sanitary conditions of schools.

IV.—LABOUR CONDITIONS.

Nigeria is still in the agricultural stage of its development. Industrialism has hardly yet appeared. The principal product of the country is that of the wild palm and man only intervenes to collect what nature produces. Other products such as ground nuts and rubber and cocoa are both planted and reaped by man. The mainstay of the country is agriculture and the African is the agriculturist.

Where specialised and costly methods are required for transport, or to win products such as tin and coal or for the intensive production of plantations, European energy, experience and capital are required. The great mass of the African people in Nigeria live under the simple conditions of the agricultural hamlet. Wherever, however, European business enterprise settles, there foci are formed round which the African villager concentrates, bringing with him the habits and customs of the village, and he is incapable of realising that such habits and customs are incompatible with healthy life in the larger community of which he is now a member.

Practically all labour in Nigeria is engaged on a purely voluntary basis from day to day or from month to month. Contract labour engaged for longer fixed periods is unusual. The labourer employed in a town finds his own house or lodgings in the town. On mines and plantations remote from towns the housing is ordinarily provided by the employer. In the towns the labourer asserts his freedom, he can leave his employment when he wishes and, if ill, many will try the native medicine man rather than go to the hospital. When rendered helpless by accident he has to submit and go to hospital. On mines and plantations where the labourers may be distant from towns or their homes they are more ready to accept qualified medical help, but there are few mining or plantation villages of any size which cannot support at least one medicine man who earns a comfortable living from the sale of charms and native herbs.

The drift of these simple people from the villages to the larger towns is not free from risk to their health. In the towns they mix with different races and tribes and encounter a pathological environment which is new to them and more concentrated than that to which they had become habituated in their village surroundings. Diseases such as tuberculosis and pneumonia take their toll and, in the mines, there is great risk of serious ankylostome infection. The Medical Officer of Health and the Sanitary Engineer can do a great deal to combat these risks but there will be no security till the co-operation of the Africans themselves is obtained. In the growing towns and in mining and plantation villages organised sanitary effort must shoulder its own burden, and can expect no assistance from people who still look on sanitation as a series of disagreeable inspections and an unreasonable interference with their accepted ways of living. A new Labour Ordinance which will make provision for sanitary control of settlements of labourers in connection with mines and plantations in Nigeria is at present under consideration.

V.—HOUSING AND TOWN PLANNING.

There is no Town Planning Ordinance in Nigeria. Under the Townships Ordinance the Governor can declare any town to be a township, and the local authority for the township has certain general powers to control streets and buildings, etc. These powers vary according to the class (first, second and third), to which the township has been declared. Lagos is the only First-class Township and the Local Authority is the Town Council. In 1924 Town Planning Committees were appointed but as these have not been effective they will be abolished as from 1st January, 1927. A very important part of town planning in Nigeria has been the provision of a European Reservation surrounded by a protecting non-residential area, outside of which is the area in which Africans trade and reside.

In the new townships the residences, offices and business premises of Europeans both official and non-official have been confined to these European Reservations, and in many townships the railway station has been placed in the building free zone. The latter fact together with the rapid commercial development of the township has resulted in making the building free zone an area of such importance to transport and commerce that its continued retention as a building free zone hampers normal development.

The whole question of town planning was discussed at the Accra Medical Conference in 1925 and recommendations were made which are now under consideration.

With regard to the Town Planning of Lagos, Mr. Thomson, the Town Planner recommended by Sir E. N. Thornton, is expected to arrive early in 1927.

VI.—FOOD IN RELATION TO HEALTH AND DISEASE.

In townships to which a sanitary staff has been appointed inspection of meat slaughtered for human consumption is done. The living animal is inspected before slaughter and the carcase after slaughter. The commonest condition found in cattle is the liver fluke *fasciola gigantica*. Other diseased conditions found include pleurisy, pleuro-pneumonia, and a cirrhotic condition of the liver in pigs. Tuberculosis in cattle is not common. The Medical Officer of Health, Lagos, in his report states that tuberculosis was only found ten times in 11,292 cattle slaughtered in Lagos.

In Lagos all bakehouses are registered and inspected regularly. Small power-driven mills are used for grinding Indian corn, which forms a very important staple article of diet among certain tribes in the Southern Provinces. In Lagos there are about

twenty-three such mills. Close supervision is kept over these premises as they readily become rat-infested. In the Northern Provinces, Guinea-corn flour is one of the principal articles of diet. The seeds of this millet are hard and are ground between two stones by hand power. Ordinarily the husk is removed from the grain before grinding. When not removed the minute particles of husk in the flour cause intestinal trouble if used as a food for any length of time.

Aerated water factories, of which there are four in Lagos, are registered.

Foods, whether local or imported, which are exposed for sale in the markets, are inspected by the sanitary staff as part of their ordinary duties. Considerable quantities of imported foods such as dried stock fish, tinned foods, which were unfit for human consumption, were destroyed in Lagos during the year.

The cleanliness of a native food market is a most difficult matter unless properly laid out markets are provided in which each shed is divided up into stalls. When this is done each stall holder can be made responsible for the cleanliness of his stall and its immediate surroundings.

B.—MEASURES TAKEN TO SPREAD THE KNOWLEDGE OF HYGIENE AND SANITATION.

Hygiene and sanitation is a subject taught in every Government and Assisted School. During part of the year the Assistant Medical Officer of Health, Lagos, gave a series of lectures to school children at the schools on "Plague and the co-operation expected from children of school age." He also gave two courses of lectures on Hygiene and Sanitation to teachers attending evening classes. In his report the Medical Officer of Health, Lagos, states that during Health Week, lectures on health were given to school children in the schools and in the Glover Memorial Hall. Two of the lectures were illustrated with lantern slides. Owing to an increase in the number of plague cases in Lagos at that time the special open air Health Week meetings and special lectures to adults had to be postponed.

At the Training College for teachers at Katsina in Northern Provinces lectures and demonstrations on hygiene and sanitation are given to the two upper classes of the College.

In most of the Provincial Schools elementary hygiene is taught.

When Medical Officers are on tour advice in sanitation is given to district and village headmen.

C.—TRAINING OF SANITARY PERSONNEL.

In Lagos a course of training is given for Sanitary Inspectors. This course extends over three years. The classes are conducted by the Assistant Medical Officer of Health, Lagos at the Lagos Town Council offices. The course includes a theoretical and practical training in disinfection and disinfectants, refuse and night-soil disposal, meat and food inspection and the general duties of a Sanitary Inspector. Practical training is given in clerical duties at the Public Health Office and in Court work at the Police Court. Vaccination is also taught. Lectures and demonstrations on the ecto- and endoparasites of man and disease-carrying insects, etc., are given. A training is also given in how to deal with infectious disease including tuberculosis and anti-malarial measures. Water supplies and ventilation are included in the course.

D.—RECOMMENDATIONS FOR FUTURE WORK.

(1) The most urgent is town planning of Lagos and provision of a controlled area on the mainland beyond Yaba for future extension of the town.

(2) Water supply for Kano and Ibadan.

(3) Improved control of sanitation in the large towns under Native Administrations particularly some simple law or code of rules imposing, through an efficient sanitary staff, on every responsible adult in the community certain sanitary duties and restrictions in the interest of the Public Health.

G. J. PIRIE,

*Deputy Director, Sanitary
Service.*

12th March, 1927.

IV.—ANNUAL REPORT OF THE PORT HEALTH OFFICER, LAGOS.

DEVELOPMENT.

The routine adopted for 1924 and 1925 was carried on during 1926 with the following further development:—

- (a) Increased powers were given to the Port Health Officer under Quarantine Regulations, 1925, and the Quarantine Ordinance, 1926, to carry out preventive measures in the Port whether the port was actually declared to be in quarantine or not.
- (b) The inspection and control of the canoe traffic in Lagos Harbour (from Carter Bridge to the sea) was taken over from the Medical Officer of Health.
- (c) The plans of the new Disinfecting Station at Apapa were passed.

THE STAFF.

The staff was increased during the latter part of the year and now consists of:—

The Port Health Officer.
 Two European Sanitary Inspectors.
 One European Rodent Inspector.
 One Native Sanitary Inspector.
 Two Native Sub-Inspectors of Sanitation.
 Three Native Sub-Inspectors of Sanitation { Lent by S.S.O.
i/c Plague for
Canoe traffic.
 Six Native Rat-catchers.
 Six Native Rat-catchers' labourers.
 One Vaccinator.
 One Female Attendant.
 One P.W.D. apprentice mechanic.
 One Caretaker (Quarantine Station).
 One Cook (Quarantine Station).
 Two Gangs of labourers (average strength twenty).

INFECTIOUS DISEASES IN OUTSIDE PORTS.

Infectious disease was notified as having occurred in the following places:—

PLAGUE.

Senegal (permanently infected).
 Santa Cruz, 15.2.26.
 Las Palmas, 25.11.26.
 Azores, 6.12.26.

YELLOW FEVER.

Nsawam, 25.3.26; 15.4.26; 1.6.26; 5.5.26; 28.6.26; 17.7.26.
 Warri, 12.4.26.
 Saltpond, 1.6.26.
 Cape Coast, 14.5.26; 20.8.26.
 Accra, 9.7.26; 23.7.26; 30.11.26.
 Asamangkese, 1.9.26; 25.9.26.
 Porto Novo, 5.9.26.

No large epidemic was reported.

MEASURES TAKEN TO PREVENT IMPORTATION OF INFECTIOUS DISEASES.

All ships arriving at Lagos were boarded, the passengers and if necessary the crew were inspected, all sick persons examined, the Bills of Health scrutinised and the answers to the questions in the Quarantine Schedule verified. A copy of the Plague Regulations, 1920, was served on the master of each arriving ship. Passengers from places where infectious disease existed were disinfected and vaccinated. No arriving passengers were placed under observation during the year.

INFECTIOUS DISEASE IN LAGOS.

Plague.—Four hundred and ninety-seven cases of plague were notified in Lagos during 1926, including some cases of pneumonic plague. From January to August, all outgoing deck passengers were examined and disinfected. From August when the number of cases of plague in Lagos began to increase till the end of the year, these passengers were kept under observation at the Quarantine Station for five days previous to embarkation, their clothing disinfected and baggage fumigated. African saloon passengers for neighbouring ports were kept under surveillance. Inoculation of passengers was discontinued in July.

Periodical Fumigation of Craft.—This was carried out as often as the inadequate equipment would permit. When the new fumigating barge arrives it is hoped to fumigate all coasting vessels monthly. Three vessels were fumigated with Zyklon B. as an experiment and this method was found to be very effective, rapid, and suitable for fumigating harbour craft and coasting vessels, but the fact that at present there is nowhere to put the passengers and crew, rather precludes its use for large sea-going ships.

Inland Water Traffic.—In order to bring this into line, and in order to make the conditions the same for native canoes as for launches, tugs, etc., the inspection and sanitary control of the native canoe traffic in the Harbour was taken over from the Senior Sanitary Officer in charge Plague. Three stations were established wherefrom all canoes were to leave and arrive at Lagos and a native sub-inspector of sanitation, assisted by a policeman was placed at each to inspect the passengers, crew, and cargo, with the object of preventing the removal of sick persons, dead bodies, or rat-infested merchandise from Lagos. The same procedure was carried out with regard to the European owned launches, tugs, etc., employed in the same traffic. Previously these latter had been treated in the same way as sea-going vessels, with the result that the natives had ceased to travel by them and went by native canoe instead.

Rats.—On the addition of one European Rodent Inspector and six native rat-catchers to the Port Health Staff in November an intensive anti-rat campaign was commenced. 2,688 rodents were caught by trapping at wharves, foreshore, and on harbour craft. Six were found to be infected :—

Customs Wharf	...	...	...	...	2
Marine Dockyard, Apapa	...	...	...	...	2
New Sheds at Apapa	...	...	...	...	1
Iddo Wharf	...	...	...	...	1
Total					6

Marine vessels and Elder Dempster branch boats were issued with rat traps earlier in the year and 125 rats were caught. Thirty-nine dead rats were removed from craft after fumigation. The total number of rodents caught was 2,861.

One case of plague in a Kroo-boy was removed from s.s. *Touareg*.

The crew's quarters and sick bay were fumigated, the crew examined and inoculated against plague. As the vessel was in transit and there was no accommodation ashore for the passengers and crew the whole ship was not fumigated. Nine rats were caught on board none of which were infected.

Yellow Fever.—Eight cases of yellow fever, all in Europeans, occurred in Lagos in 1926, all within 500 yards of the water front. Two of them occurred in ships in the harbour, s.s. *Sir George* and s.s. *Fantiman*. Both ships were fumigated and oiled and the crew placed under surveillance. Two of the native crew of the s.s. *Sir George*, who may have been carriers were sent to the Infectious Diseases Hospital suffering from slight jaundice, low fever and albuminuria.

Inspection of Craft.—Inspection of all craft was systematically carried out, the owners of vessels found to contain larvae were summoned and in the case of Marine Department, disciplinary action was taken by the Principal Marine Officer at Apapa and the Harbour Master. There has been a great improvement in the sanitary condition of all the lighters, tugs, etc., in 1926 especially in the craft owned by shipping firms. Anti-mosquito mixture (kerosene-carbolacene-crude oil) was issued from time to time to the Marine Department and the Harbour Master sent a return to the Port Health Officer periodically stating the date of oiling of the bilges of each vessel.

Inspection of Foreshore.—The foreshore on both sides of the Harbour and the canoes moored thereat was inspected by the sanitary inspector and the sub-inspectors under the supervision of a European Sanitary Inspector who patrolled the foreshore with a small gang of labourers clearing up old tins, bottles, etc., and oiling and filling up crab holes. Communication to the owners of the various pieces of scrap iron, old boilers, etc., resulted in the removal or covering over of most of it.

Smallpox.—There appears to have been very little smallpox in Lagos or the neighbouring ports as no port was notified as being infected. All non-vaccinated incoming and outgoing passengers were vaccinated.

Other Sanitary Measures.—1,050 blankets from Lagos Prison were disinfected by the Thresh disinfector.

A considerable quantity of food-stuff chiefly stock-fish was condemned as unfit for human food and was dumped at sea or in Badagry Creek.

G. R. WALLER,
Port Health Officer.

Port Health Office,
Lagos,
5th January, 1927.

PORT HEALTH RETURN FOR THE YEAR ENDING 31ST DECEMBER, 1926.

Ocean-going Shipping.

Number of ships entered	...	...	...	634
Number of ships cleared	...	...	...	640
Number of passengers examined	...	...	...	27,598
Number of passengers vaccinated	...	...	...	18,512
Number of passengers inoculated against plague	...	...	...	16,303
Number of passengers under surveillance	...	...	...	713
Number of passengers under observation	...	...	...	2,638
Number of passengers disinfected and kits fumigated	...	...	...	12,551
Number of ships fumigated	...	...	...	6
Number of infectious diseases on ships	...	...	...	3

<i>Name of ship.</i>	<i>Disease.</i>	<i>Measure taken.</i>
<i>Sir George</i>	Yellow fever	Ship fumigated and crew under surveillance.
<i>Fantiman</i>	Yellow fever	Ship fumigated,
<i>Touareg</i>	Plague	Crew inoculated and crew's quarters and sick bay fumigated.

Notice to Abate Nuisances.

Number of abatement notices served	...	...	...	11
Number not complied with	...	...	...	5
Number of summons applied for	...	...	...	38
Number of summons for larvae	...	...	...	33
Number of persons fined	...	...	...	37
Number discharged	...	...	...	1
Total Fines	...	...	...	£19 13s. 0d.

Craft, Lagos Harbour.

Number of craft permanently stationed in Lagos	...	...	...	...	...	170
Number of inspections carried out	...	...	...	...	...	5,508
Number of craft oiled	...	...	...	...	...	181
Number of craft fumigated	...	...	...	...	...	40

Canoe Traffic.

Number of canoes inspected	...	...	...	881
Number of passengers travelling by canoe inspected	...	...	...	9,745

1. Sanitation of Foreshore.

Wells.

Number filled in	1
------------------	-----	-----	-----	-----	---

*2. Water receptacles.**Inspected. Oiled. Larvæ.*

Tanks	...	...	238	13	Nil
Barrels	...	...	1,133	20	„
Catch Pits	...	..	63	18	1
Drains	...	...	346	52	7

<i>3. Wharves.</i>	...	...	...	58	48 (<i>Clean</i>)	10 (<i>Dirty</i>)
Wagons	...	...	...	285	260	„ 25 „

Compounds.

Number of compounds inspected	...	...	861
Number of compounds dirty	...	...	145
Number of rooms containing larvae	...	...	8

Vermin.

Number of rats caught on Marine ships and branch boats	125
Number of rats destroyed by fumigation ...	39
By trapping on s.s. <i>Touareg</i>	9
By trapping on wharves and foreshore ...	2,688
	<hr/>
	2,861
	<hr/>
Total rodents caught	2,861

Positive rats.

At Customs Wharf	2
At Marine Dockyard, Apapa	2
At Iddo Wharf	1
At New Sheds, Apapa	1
	<hr/>
Total positive rats	6

G. R. WALLER,
Port Health Officer.

V.—MATERNITY AND CHILD WELFARE.

The Massey Street Dispensary was only opened on 1st November, 1926, with a women and children's section in charge of a Lady Medical Officer. It is well equipped with a modern labour ward, labour theatre and theatre for gynaecological cases and also consulting room and dressing rooms for out-patients. Until the end of the year, 1,288 out-patients were treated and out-patient attendances were 4,463. Three maternity cases were admitted to the ward. These cases are included in the Return of Diseases and Deaths.

This section supplies a long felt want in the treatment of diseases in women and children.

Maternity and child welfare work is carried out generally in the various hospitals but usually only difficult and delayed labour cases are seen. During the year the Sacred Heart Hospital, Abeokuta, was converted into a Maternity Hospital with an infant welfare clinic attached and placed in charge of a Lady Medical Officer with a European Sister who is also a qualified midwife.

The Sacred Heart Hospital has been conducted by Father Coquard of the Lyons Sacred Heart Mission for over thirty years and a very large number of midwifery cases have been attended.

The following figures show the work done in that part of the Sacred Heart Hospital which is conducted under Government auspices.

Diseases of female generative organs	1,099
Diseases of maternity and parturition	367
Diseases of infancy	176
Normal labour	143
Difficult labour	109

A total of 273 in-patients and 2,957 out-patients were attended. There is no doubt that the people realise the advantages of maternity and child welfare work and the amount of work done will only be limited by the staff and accommodation provided.

At Ilorin the Medical Officer registered 438 births during the last nine months of the year, 202 were again examined by the Medical Officer at six months old and all were vaccinated.

Taking into consideration the children who were lost sight of the Medical Officer is of opinion that the infant mortality was about 378 per 1,000. The spleen rate in those examined was between seventy-five and eighty *per cent*.

VI.—HOSPITALS, DISPENSARIES AND VENEREAL CLINICS.

New hospitals are being erected at the following stations although none were in operation during 1926; Lagos, Ibadan, Enugu, Aba, Kumba, Mamfe and Bamenda.

Massey Street Dispensary with a section for women and children under the charge of a Lady Medical Officer was opened in November, 1926. Part of the Sacred Heart Hospital, Abeokuta, under the charge of a Lady Medical Officer was opened during the year. Details of the work done is shown under Section V, Maternity and Child Welfare.

A European hospital was opened at Jos and has been working at its full capacity in the latter part of the year. There has been a large increase in the number of patients attending hospitals and dispensaries during the year.

				1926.	1926.
				In-patients.	Out-patients.
Europeans	...	...	...	1,264	6,643
Africans	...	...	...	24,800	229,378
				1925.	1925.
				In-patients.	Out-patients.
Europeans	...	...	...	1,203	5,395
Africans	...	...	...	20,647	197,655

The principal diseases treated were:—

EUROPEANS.

Malaria, influenza, dysentery, arthritis, anaemia, affections of the ear, bronchitis, gastritis and enteritis.

AFRICANS.

Malaria, influenza, dysentery, leprosy, yaws, syphilis, gonorrhoea, anaemia, conjunctivitis, bronchitis, gastritis, enteritis, cestoda, constipation, cellulitis, ulcers and wounds.

Details are shown under Return of Diseases and Deaths, Tables V and VI.

There is a venereal clinic attached to the Massey Street Dispensary and special facilities for the prevention and treatment of venereal diseases are provided for the Nigeria Regiment.

Venereal diseases are treated at all hospitals and dispensaries.

VII.—PRISONS AND ASYLUMS.

Government Prisons.—There is a progressive improvement in the general health of prisoners in Government Prisons as compared with 1925 and 1924. The death rate for Government Prisons, Northern and Southern Provinces, was:—

28.05 per thousand as against 34.05 per thousand in 1925.

The following figures give an indication of the general health of prisoners in Government Prisons.

				Northern Provinces.	Southern Provinces.
Average daily number in Prison	...	...	...	775	7,313
Total number on sick list	...	...	...	592	4,951
" " of days on sick list	...	...	...	7,505	70,966
Average daily sick	...	...	...	20	194
Total number of deaths	...	...	...	27	156
Death rate per 1,000	...	...	...	34.8	21.3

PRISONS—SOUTHERN AND NORTHERN PROVINCES.
The following table shows the causes of deaths:—

Disease.	Deaths.	Disease.	Deaths.
<i>Southern.</i>			
Pneumonia	34	Brought forward ...	99
Local Injury	2	Abscess	1
Aneurism	1	Chronic Nephritis ...	2
Dysentery	27	Ankylostomiasis ...	1
Dropsy	2	Hernia	1
Rheumatism and Ulcer ...	2	Gonorrhœa	1
Peritonitis	2	Tuberculosis	1
Tetanus	3	Cellulitis	2
Influenza	5	Malaria Fever	2
Pyæmia	2	Enteritis	15
Cardiac Disease	11	Empyemia	1
Septicæmia	5	Phthisis	1
Neuralgia	1	Cerebral Anæmia ...	1
Pachymeningitis	1	Natural Causes (Coroners	
Stricture	1	Inquest no details given)	25
		Indefinite	3
Carried forward	99	Total	156

Disease.	Deaths.
<i>Northern.</i>	
Dysentery and Exhaustion	3
Ankylostomiasis	1
Pleurisy	1
Broncho Pneumonia	2
Cardiac Disease	3
Tuberculosis	1
Diarrhœa	1
Trypanosomiasis	1
Natural Causes	14
	27
	Total Southern ... 156
	Total Deaths ... 183

Native Administration Prisons.—Reliable statistics are not available. Most of the Native Administration Prisons are only visited at intervals by Medical Officers.

The general health as recorded in their inspection notes has been good.

Daily average number in prison	349.93
Total number of deaths	147
Death rate per thousand	11.3

Disease.	Deaths.	Disease.	Deaths.
		Brought Forward ...	123
Fever	8	Accident	1
Dysentery	30	Senility	2
Diarrhœa	3	Pleurisy	2
Pneumonia	25	Septicæmia	1
Strangulated Hernia ...	1	Cancer of stomach ...	1
Enteritis	1	Colitis	3
Cystitis	1	Cellulitis	2
Relapsing Fever	7	Mediostinall Abscess ...	1
Heart Disease	6	Glossitis	1
Debility	1	Chronic Osteo-Arthritis ...	1
Venereal Disease	5	Epilepsy	2
Cerebro Spinal Meningitis	3	Ascites	1
Peritonitis	3	Injury to Spine	1
Bronchitis	3	Influenza	1
Tuberculosis	14	Unknown	3
Malaria	10	Ill-defined	1
Acute nephritis	2		
Carried Forward	123	Total	147

Asylums.—The principal asylum is established at Yaba, Lagos, and is in charge of a Medical Officer with previous asylum experience.

During the year 119 patients were in residence and four patients died. Most of the patients are chronic and presumably irrecoverable but latterly treatment has been instituted for cases presumably recoverable with the result that six were discharged as cured.

There is an asylum at Calabar where eighteen patients are accommodated, mostly chronic cases.

The general health has been good. There were six deaths during the year.

Proposals have been under consideration for the erection of a modern asylum at Lagos but these will have to await the building programme.

An Alienist has been approved but will not be appointed till 1928-29. His experience is desired in determining the nature and extent of the provision that should be made and can be accomplished with advantage.

VIII.—METEOROLOGY.

There were no unusual meteorological conditions during the year 1926.

Since May, 1926, special rainfall records have been kept by the Survey Department with a view to the analysis of the rainfall all over Nigeria.

The average rainfall for the Northern Provinces is 42.62 inches, the stations with the lowest rainfalls are Maiduguri, fifteen inches, Sokoto, Katsina and Hadeji. The highest rainfall was recorded at Kaduna and Jos.

In the Southern Provinces the average annual rainfall was 78.61 inches, the highest recorded rainfall was Brass, 136.83 inches; Calabar, Forcados and coast stations generally are over 100 inches per year while Agege, Ibadan, Olokemeji, Oyo, are all under fifty inches.

Debundscha in the Cameroons had a rainfall of 244.35 inches for six months ending 31st December, 1926.

METEOROLOGICAL RETURNS FOR 1926.

TABLE IV.

STATION.	Absolute Shade Max.	Absolute Shade Min.	Average Max.	Average Min.	Relative Humidity.	Rainfall inches.
	°	°	°	°	%	
Ilorin	97·1	60·9	90·6	68·1	81·6	52·98
Kaduna	95·6	56·9	88·7	64·6	60·5	69·72
Maiduguri	109	56·3	98·7	68·2	47·2	15·57
Kano	102·6	54·3	93·3	66·9	45·2	27·57
Lokoja	96·9	62·4	88·5	70·9	73·6	38·14
Yola	102·2	65·3	92·8	72·5	58·5	51·75
Lagos	91·4	72·8	86·6	75·4	79·8	75·97
Ibadan	100·1	68·6	93·6	71·1	90·	46·94
Calabar	92·8	62	86·6	68·7	86·3	105·19
Enugu	94·8	66	89·3	70·1	78·8	64·10

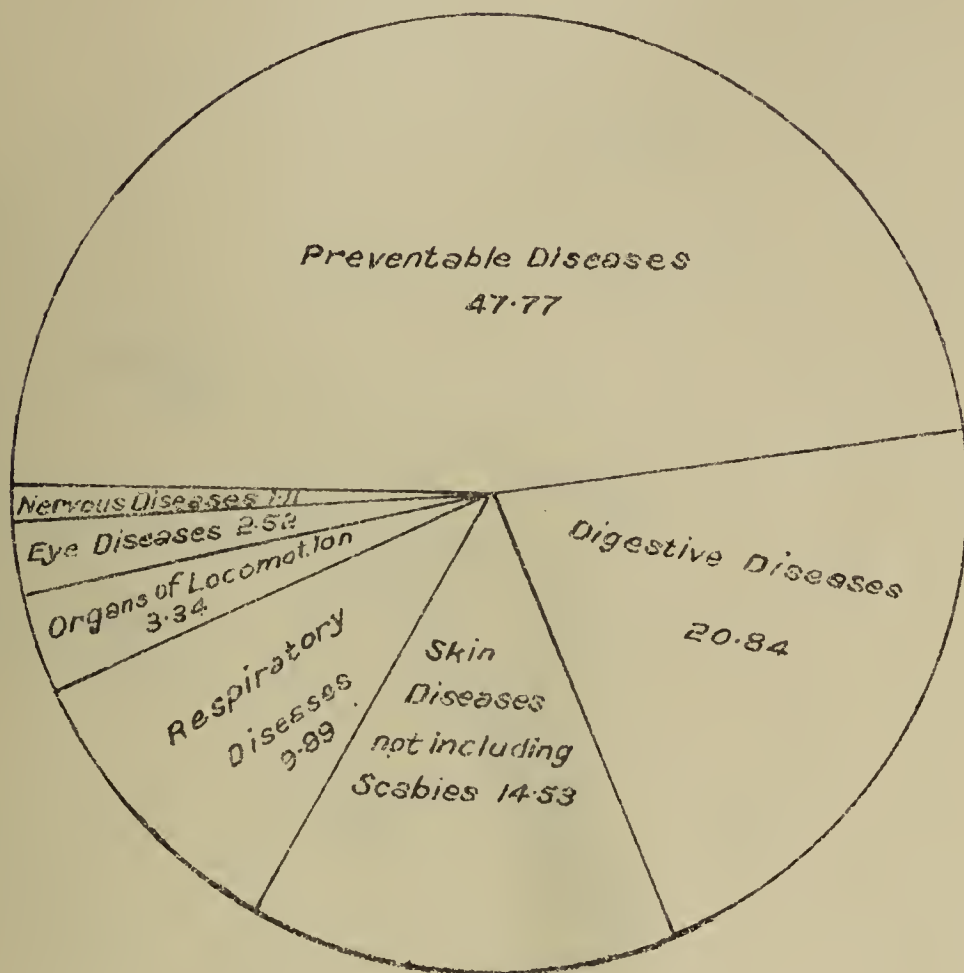
IX.—RETURN OF SURGICAL OPERATIONS.

TABLE VII.

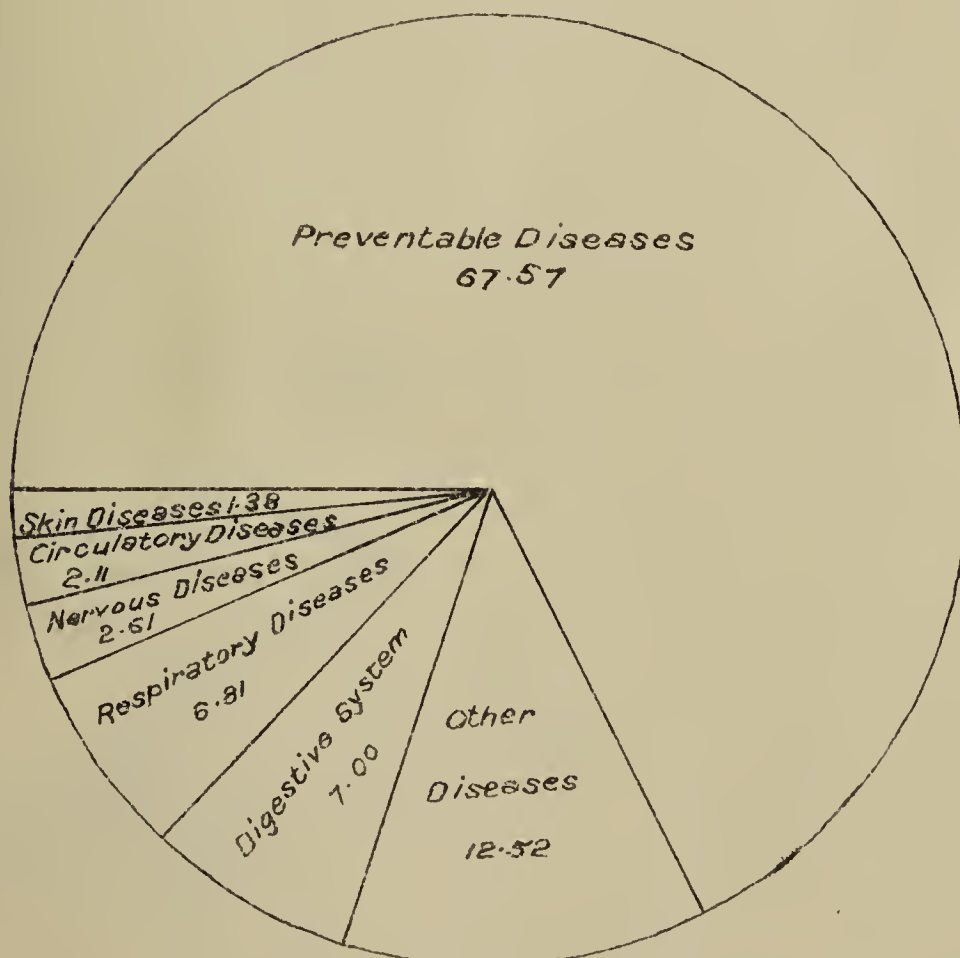
	Total Cases.	Cured.	Relieved.	Unrelieved.	Died.
A. GENERAL.					
Amputations	102	77	14	1	10
Appendectomy	27	23	...	...	4
Fractures Plated	11	10	1	...	...
Gastro-Enterostomy	15	12	...	...	3
Herniotomy	715	659	18	1	37
Hepatic Abscess Drainage	6	5	...	...	1
Laparotomy	19	2	2	5	10
Acute Pancreatitis	1	1	...	...	...
Hæmorrhoids Radical Cure	36	36	...	...	...
Excision—Benign Tumours and Cysts	323	287	12	2	22
Nephrotomy	2	1	1	...	...
Excision-Malignant Tumours Sarcoma	10	1	5	4	...
Carcinoma	2	...	2	...	...
Excision—Glands... ..	40	37	3	...	...
Excision - Breast... ..	3	3	...	...	...
Enterectomy	6	3	2	...	1
Sequestrotomy	89	74	11	2	2
Thyroidectomy	17	15	...	...	2
Trephining	8	3	...	...	5
Other operations	419	398	17	4	...
Splenectomy	1	1	...	...	...
Cholecystectomy	2	2	...	...	...
B. EYE.					
Cataract Extraction	20	11	8	1	...
Enucleation	9	3	6	...	...
Iridectomy	7	2	5	...	...
Other operations	13	13	...	...	...
C. EAR.					
Mastoid - Schwartze's opera- tion	4	3	1	...	...
Other operations	2	1	...	...	1
D. GENITO—URINARY—MALE.					
External Urethrotomy	20	12	7	1	...
Dilatation of Stricture	264	131	130	1	2
Elephantiasis of Scrotum	120	113	4	...	3
Hydrocele	275	199	76	...	...
Circumcision	413	413	...	...	...
Cystotomy	12	8	3	1	...
Orchidectomy	14	10	3	1	...
Other operations	1	1	...	...	...
2. Genito—Urinary—Female.					
Abdominal Hysterectomy	29	22	...	...	7
Ovariectomy	12	12	...	...	...
Salpingectomy	7	4	3	...	...
Hysteropenxy	3	2	1	...	...
Perineoplasty	10	8	1	1	...
Endometritis	69	63	3	1	2
Colponaphy	8	7	1	...	..
E. OBSTETRICAL.					
Forceps Extraction	120	99	1	1	19
Podalic Version	5	5	...	...	...
Craniotomy	4	1	...	...	3
Ectopic Pregnancy	2	1	1	...	...
Cæsarian Section	4	1	1	...	2
Other operations	26	24	1	1	...
F. MINOR SURGICAL OPERATIONS ...					
	3,221	2,872	290	26	33
Total					
	4,639	4,008	526	34	71

GENERAL SYSTEMIC AND PREVENTABLE DISEASES.

Total Cases 261,402.

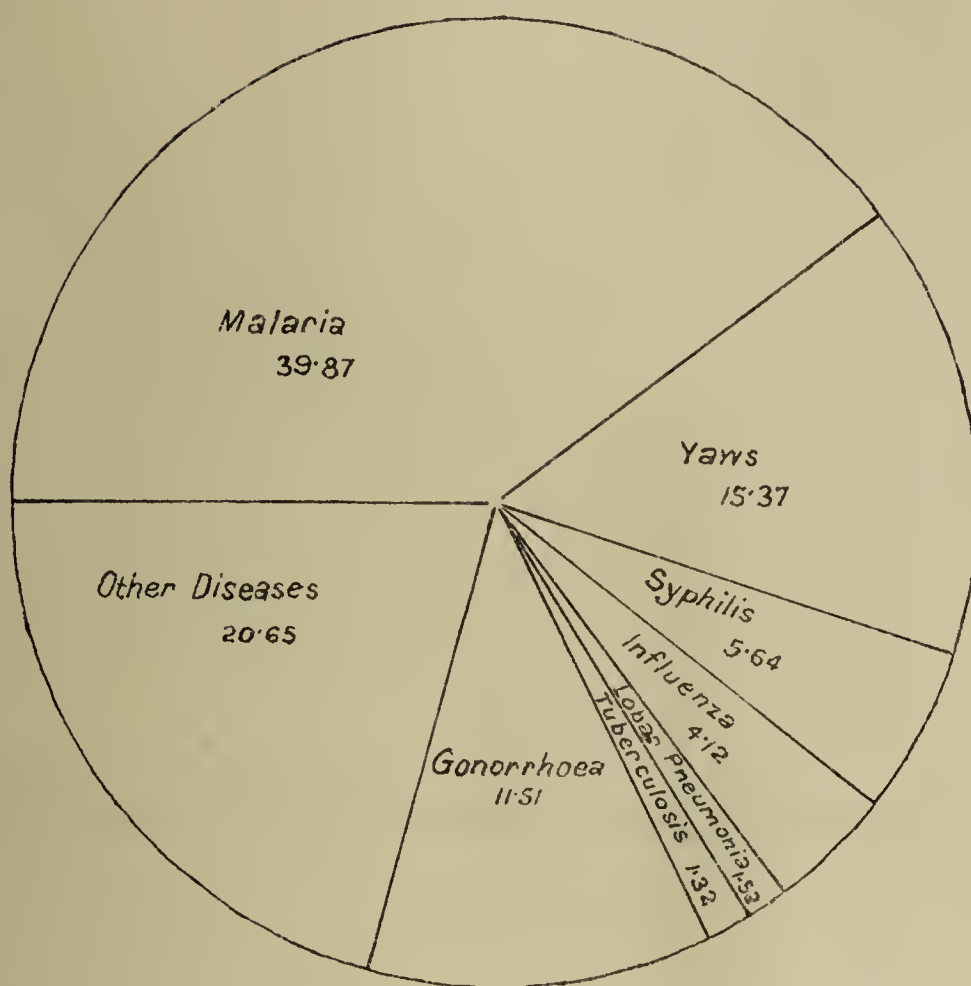


Total Deaths 2,871.

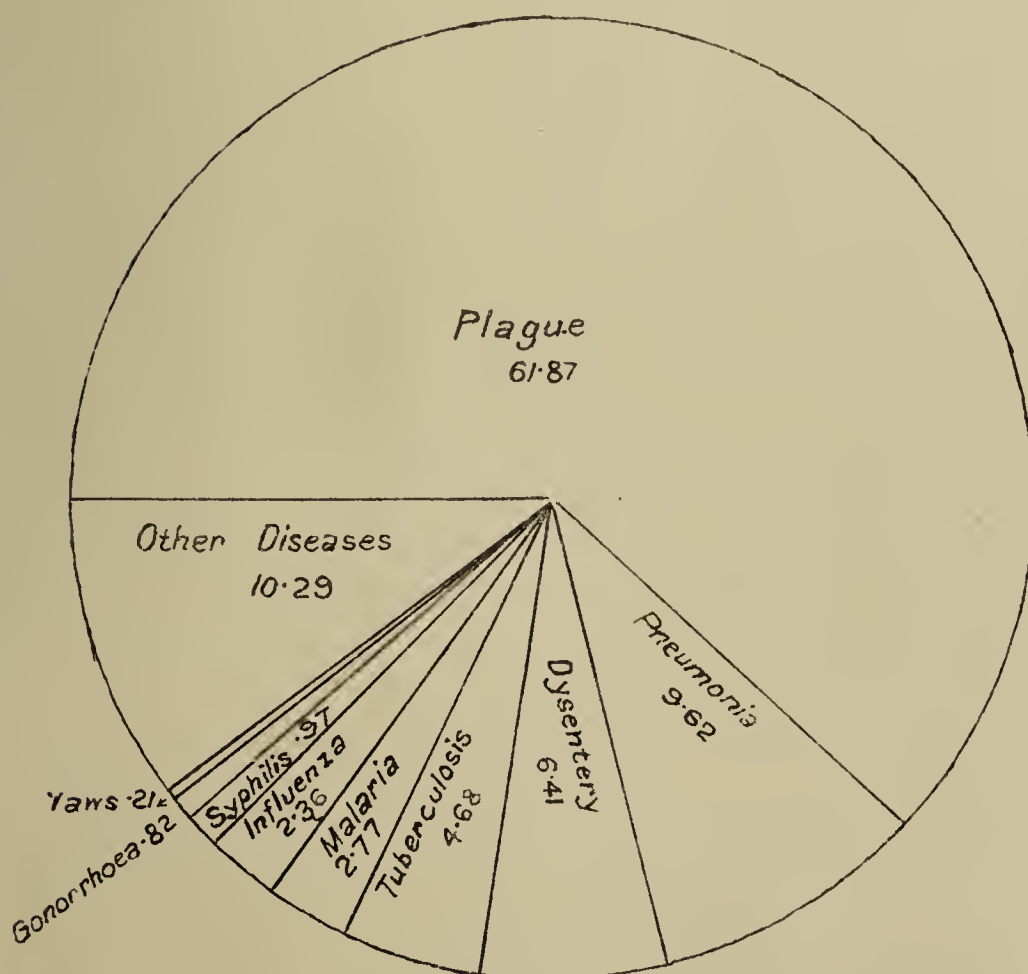


INFECTIVE DISEASES

Total Incidence 59,184



Total Deaths 1941



**XI.—RETURN OF DISEASES AND DEATHS FOR THE
YEAR 1926.**

1. EUROPEANS.
2. AFRICANS.

TABLE V.

RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1926.

Diseases.				IN-PATIENTS.				OUT-PATIENTS.	
				Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.
					Admis- sions.	Deaths.			
I.— <i>Epidemic, Endemic, and Infectious Diseases.</i>									
1.	Enteric Group—								
	(a)	Typhoid Fever	...	...	2	1	2	...	1
	(b)	Paratyphoid A.	...	...	4	...	4	1	1
	(c)	Paratyphoid B.	...	...	...	...	...	...	...
	(d)	Type not defined	...	...	...	...	...	...	...
2.	Typhus ...			...	...	...	...	...	...
3.	Relapsing Fever			...	...	...	...	...	...
4.	Undulant Fever			...	...	...	...	...	...
5.	Malaria—								
	(a)	Tertian ...	...	...	5	...	5	1	21
	(b)	Quartan	...	...	...	...	...	...	2
	(c)	Aestivo-autumnal	...	6	350	3	356	3	926
	(d)	Cachexia	...	...	4	...	4	...	13
	(e)	Blackwater	...	1	28	8	29	1	2
6.	Smallpox—			...	1	...	1	...	1
	Alastrim			...	...	...	...	...	...
7.	Measles ...			...	1	...	1	...	2
8.	Scarlet Fever			...	1	...	1	...	...
9.	Whooping Cough			...	...	...	...	...	...
10.	Diphtheria			...	...	...	...	...	...
11.	Influenza			...	21	...	21	...	209
12.	Miliary Fever			...	...	...	...	...	2
13.	Mumps ...			...	...	...	...	...	2
14.	Cholera ...			...	...	...	...	...	...
15.	Epidemic diarrhoea			...	...	...	...	...	...
16.	Dysentery—								
	(a)	Amœbic	...	2	40	...	42	...	55
	(b)	Bacillary	...	...	2	...	2	...	4
	(c)	Undefined or due to other causes	...	...	3	...	3	...	4
17.	Plague—								
	(a)	Bubonic	...	...	...	...	...	...	...
	(b)	Pneumonic	...	...	1	1	1	...	...
	(c)	Septicaemic	...	...	...	...	...	...	...
	(d)	Undefined	...	...	...	...	...	...	1
18.	Yellow Fever ...			...	11	7	11	...	1
19.	Spirochaetosis ictero-hæmorrhagica			...	...	...	...	...	...
20.	Leprosy ...			...	...	...	...	...	...
21.	Erysipelas			...	1	...	1	...	...
22.	Acute Poliomyelitis			...	...	...	...	...	...
23.	Encephalitis Lethargica			...	...	...	...	...	...
24.	Epidemic Cerebro-spinal Fever			...	...	...	...	...	...
25.	Other Epidemic Diseases—								
	(a)	Rubeola (German Measles)	...	...	...	...	...	...	1
	(b)	Varicella (Chicken-pox)	...	...	...	...	...	...	1
	(c)	Kala-azar	...	...	...	...	...	...	...
	(d)	Phlebotomus Fever	...	...	6	...	6	...	2
	(e)	Dengue ...	...	...	5	...	5	1	7
Carried forward				9	486	20	495	7	1,260
									5

TABLE V.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	9	486	20	495	7	1,260	5
I.— <i>Epidemic, Endemic, and Infectious Diseases—contd.</i>							
(f) Epidemic Dropsy
(g) Yaws
(h) Trypanosomiasis
26. Glanders
27. Anthrax
28. Rabies
29. Tetanus	1	1	1	...	1	...
30. Mycosis
31. Tuberculosis, Pulmonary and Laryngeal	6	1	6	...	5	...
32. Tuberculosis of the Meninges or Central Nervous System
33. Tuberculosis of the Intestines or Peritoneum
34. Tuberculosis of the Vertebral Column
35. Tuberculosis of Bones and Joints
36. Tuberculosis of other organs—							
(a) Skin or Subcutaneous Tissue (Lupus)
(b) Bones
(c) Lymphatic System	1	...	1	...	4	...
(d) Genito-urinary
(e) Other Organs
37. Tuberculosis disseminated—							
(a) Acute
(b) Chronic
38. Syphilis—							
(a) Primary	1	10	...	11	1	26	...
(b) Secondary	1	...	1	...	11	...
(c) Tertiary	2	...	2	...	1	...
(d) Hereditary
(e) Period not indicated
39. Soft Chancre	2	...	2	...	18	...
40. A.—Gonorrhœa and its com- plications	2	12	...	14	...	120	...
B.—Gonorrhœal Ophthalmia
C.—Gonorrhœal Arthritis	2	...	2	...	...	...
D.—Granuloma Venereum
41. Septicaemia	2	1	2	...	1	...
42. Other Infectious Diseases— Trypanosomiasis	1	...
II.— <i>General Diseases not men- tioned above.</i>							
43. Cancer or other malignant Tumours of the Buccal Cavity	1	...	1	...	...	...
Carried forward	12	526	23	538	8	1,448	5

TABLE V.—RETURN OF DISEASES AND DEATHS (EUROPEAN)

FOR THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	12	526	23	538	8	1,448	5
II.— <i>General Diseases not men- tioned above—contd.</i>							
44. Cancer or other malignant Tumours of the Stomach or Liver	1	...	1	...	...	...
45. Cancer or other malignant Tumours of the Peritoneum intestines, Rectum
46. Cancer or other malignant Tumours of the Female Geni- tal Organs
47. Cancer or other malignant Tumours of the Breast
48. Cancer or other malignant Tumours of the Skin
49. Cancer or other malignant Tumours of Organs not specified	1	1	1	...	...	...
50. Tumours non-Malignant	2	...	2	...	24	...
51. Acute Rheumatism	3	...	3	1	38	...
52. Chronic Rheumatism	1	10	...	11	...	113	...
53. Scurvy (including Barlow's Disease)
54. Pellagra
55. Beri-Beri
56. Rickets
57. Diabetes (not including Insi- pidus)	3	...
58. Anæmia— (a) Pernicious
(b) Other Anæmias and Chlo- rosis	21	...	21	...	238	...
59. Diseases of the Pituitary Body
60. Diseases of the Thyroid Gland— (a) Exophthalmic Goitre	1	...
(b) Other diseases of the Thyroid Gland, Myxœ- dema	1	...	1	...	...	...
61. Diseases of the Para-Thyroid Glands...
62. Diseases of the Thymus
63. Diseases of the Supra-Renal Glands
64. Diseases of the Spleen	9	...
65. Leukæmia— (a) Leukæmia
(b) Hodgkin's Disease
66. Alcoholism	14	...	14	1	3	...
67. Chronic poisoning by mineral substances (lead, mercury, &c.)
68. Chronic poisoning by organic substances (Morphia, Cocaine, &c.)
Carried forward	13	579	24	592	10	1,877	5

TABLE V.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	13	579	24	592	10	1,877	5
II.— <i>General Diseases not men- tioned above—contd.</i>							
69. Other General Diseases—							
Auto-intoxication	1	...
Purpura Hæmorrhagica
Hæmophilia
Diabetes Insipidus	1	...	1	...	1	...
III.— <i>Affections of the Nervous System and Organs of the Senses.</i>							
70. Encephalitis (not including Encephalitis Lethargica)
71. Meningitis (not including Tuberculous Meningitis or Cerebro-spinal Meningitis)
72. Locomotor Ataxia
73. Other affections of the Spinal Cord
74. Apoplexy—							
(a) Hæmorrhage
(b) Embolism
(c) Thrombosis
75. Paralysis—							
(a) Hemiplegia
(b) Other Paralyzes	1	...	1	...	...	...
76. General Paralysis of the Insane
77. Other forms of mental Alienation	2	...	2	...	...	...
78. Epilepsy	1	...	1	...	...	...
79. Eclampsia, Convulsions (non- puerperal) 5 years or over
80. Infantile Convulsions
81. Chorea
Neuralgia	24	...
82. A.—Hysteria	1	...	1	...	...	...
B.—Neuritis	10	...	10	...	82	...
Shock Insomnia	2	...
C.—Neurasthenia	1	29	...	30	...	86	...
83. Cerebral Softening
84. Other affections of the Ner- vous System, such as Paralysis Agitans	1	...	1	...	3	...
85. Affections of the Organs of Vision—							
(a) Diseases of the eye	9	...
(b) Conjunctivitis	4	...	4	...	78	...
(c) Trachoma
(d) Tumours of the Eye	1	...	1	...	...	...
(e) Other affections of the Eye	4	...	4	...	69	...
86. Affections of the Ear or Mastoid Sinus	12	...	12	...	217	...
Carried forward	14	646	24	660	10	2,449	5

TABLE V.—RETURN OF DISEASES AND DEATHS (EUROPEAN)

FOR THE YEAR 1926—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	14	646	24	660	10	2,449	5
IV.— <i>Affections of the Circulatory System</i>							
87. Pericarditis ... ..	...	...	...	..	...	...	...
88. Acute Endocarditis or Myo- carditis ... ..	...	...	...	...	...	...	...
89. Angina Pectoris ... ..	...	...	...	...	...	...	...
90. Other Diseases of the Heart—	...	1	...	1	...	1	...
(a) Valvular—							
Mitral ... ..	...	3	...	3	...	1	...
Aortic ... ..	...	1	...	1	...	1	...
Tricuspid ... ..	...	...	...	...	...	...	...
Pulmonary ... ..	...	...	...	...	...	...	...
(b) Myocarditis ... ..	...	7	...	7	...	18	...
91. Diseases of the Arteries—							
(a) Aneurism ... ..	...	...	...	...	...	...	...
(b) Arterio-Sclerosis ... ..	...	...	...	...	...	1	...
(c) Other diseases ... ..	...	2	...	2	...	8	...
92. Embolism or Thrombosis (non- cerebral) ... ..	...	...	...	...	...	...	...
93. Diseases of the Veins—							
Hæmorrhoids ... ..	...	11	...	11	1	35	...
Varicose Veins ... ..	...	3	...	3	...	5	...
Phlebits ... ..	...	3	...	3	...	4	...
94. Diseases of the Lymphatic System—							
Lymphangitis	1	4	...	5	...	6	...
Lymphadenitis, Bubo (non- specific) ... ..	...	19	...	19	3	61	...
95. Hæmorrhage of undetermined cause ... ..	...	1	...	1	...	3	...
96. Other affections of the Circula- tory System ... ..	...	1	...	1	...	2	...
V.— <i>Affections of the Respiratory System.</i>							
97. Diseases of the Nasal Passages—							
Adenoids ... ..	...	...	...	...	...	1	...
Polypus ... ..	...	...	...	...	...	...	...
Rhinitis ... ..	...	1	...	1	...	26	...
Coryza ... ..	...	3	..	3	...	82	...
98. Affections of the Larynx—							
Laryngitis .. ...	...	2	...	2	...	42	...
Papilloma ... ..	...	1	...	1	...	...	...
99. Bronchitis—							
(a) Acute ... ..	...	16	...	16	1	299	...
(b) Chronic ... ..	...	1	...	1	...	17	...
100. Broncho-Pneumonia ... ..	...	3	...	3	...	3	...
101. Pneumonia—							
(a) Lobar	1	5	1	6	...	1	...
(b) Unclassified ... ..	...	2	2	2	...	4	...
102. Pleurisy, Empyema ... ..	...	5	...	5	...	13	...
103. Congestion of the Lungs ... ..	...	1	...	1	...	1	...
104. Gangrene of the Lungs ... ..	...	1	...	1	...	...	...
105. Asthma ... ..	...	5	...	5	..	8	...
106. Pulmonary Emphysema ... ..	...	...	...	...	...	...	...
107. Other affections of the Lungs—	...	...	...	...	...	5	...
Pulmonary Spirochaetosis ... ..	...	...	...	...	...	...	...
Carried forward	16	748	27	764	15	3,097	5

TABLE V.—RETURN OF DISEASES AND DEATHS (EUROPEAN)

FOR THE YEAR 1926—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths
Brought forward	16	748	27	764	15	3,097	5
VI.— <i>Diseases of the Digestive System.</i>							
108. A.—Diseases of Teeth or Gums—	...	1	...	1	...	...	...
Caries, Pyorrhœa, &c.	6	...	6	...	217	...
B.—Other affections of the Mouth—
Stomatitis	1	...	1	...	11	...
Glossitis, &c.	9	...
109. Affections of the Pharynx or Tonsils—
Tonsillitis	19	...	19	...	103	...
Pharyngitis	2	...	2	...	71	...
110. Affections of the Œsophagus
111. A.—Ulcer of the Stomach	6	...	6	...	3	...
B.—Ulcer of the Duodenum ...	2	3	...	5	...	3	...
112. Other affections of the Stomach—	15	...
Gastritis	2	37	...	39	1	228	...
Dyspepsia, &c.	14	...	14	...	312	...
113. Diarrhœa and Enteritis—	33	...
Under two years
114. Diarrhœa and Enteritis—
Two years and over	42	...	42	1	221	...
Colitis	8	...	8	1	28	...
Ulceration	4	...
114a. Sprue
115. Ankylostomiasis
116. Diseases due to Intestinal Parasites—
(a) Cestoda (Tænia)	1	...	1	..	4	...
(b) Trematoda (Flukes)
(c) Nematoda (other than Ankylostoma)—
Ascaris	1	...	1	...	5	...
Trichocephalus dispar
Trichina
Dracunculus	1	...
Filaria	1	...
Strongylus
Oxyuris	2	...
(d) Coccidia	2	...
(e) Other parasites	5	...
(f) Unclassified
117. Appendicitis	2	21	2	23	3	15	...
118. Hernia	1	5	...	6	...	8	...
119. A.—Affections of the Anus, Fistula, &c.	1	...	1	...	4	...
B.—Other affections of the Intestines—	5	...
Enteroptosis	1	...	1	1	...	...
Constipation	8	...	8	...	130	...
120. Acute Yellow Atrophy of the Liver	1	...
121. Hydatid of the Liver
Carried forward	23	925	29	948	22	4,538	5

TABLE V.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	23	925	29	948	22	4,538	5
VI.— <i>Diseases of the Digestive System</i> —continued.							
122. Cirrhosis of the Liver—							
(b) Other forms ... ..	...	...	...	...	...	2	...
(a) Alcoholic ... ..	...	1	...	1	...	...	...
123. Biliary Calculus ... ..	...	2	...	2	...	1	...
124. Other affections of the Liver—							
Abscess ... ..	...	1	...	1	...	...	...
Hepatitis	1	8	...	9	...	37	...
Cholecystitis... ..	...	2	...	2	...	8	...
Jaundice ... ..	...	6	...	6	...	10	...
125. Diseases of the Pancreas ... ..	...	...	...	...	...	...	...
126. Peritonitis (of unknown cause) ... ..	...	...	...	...	...	3	...
127. Other affections of the Digestive System ... ..	...	5	...	5	...	81	...
VII.— <i>Diseases of the Genito-urinary System (non-Venereal)</i> .							
128. Acute Nephritis ... ..	...	2	1	2	...	4	...
129. Chronic ... ..	...	2	2	2	...	4	...
130. A.—Chyluria ... ..	...	...	...	...	...	...	...
B.—Schistosomiasis ... ..	...	...	...	...	...	1	...
131. Other affections of the Kidneys—							
Pyelitis, &c. ... ..	...	7	...	7	...	4	...
132. Urinary Calculus ... ..	...	3	...	3	...	7	...
133. Diseases of the Bladder—							
Cystitis	1	6	...	7	...	44	...
134. Diseases of the Urethra—							
(a) Stricture ... ..	...	1	...	1	...	6	...
(b) Other ... ..	...	4	...	4	...	21	...
135. Diseases of the Prostate—							
Hypertrophy ... ..	...	...	...	...	...	13	...
Prostatitis ... ..	...	2	..	2	...	3	...
136. Diseases (non-Venereal) of the Genital Organs of Man—							
Epididymitis ... ..	...	3	...	3	...	9	...
Orchitis ... ..	...	5	...	5	...	12	...
Hydrocele ... ..	...	...	...	...	...	4	...
Ulcer of Penis ... ..	...	2	...	2	...	16	...
137. Cysts or other non-malignant Tumours of the Ovaries ... ..	...	...	...	...	...	...	...
138. Salpingitis—							
Abscess of the Pelvis ... ..	...	...	...	...	...	...	...
139. Uterine Tumours (non-malignant) ... ..	...	...	...	...	...	...	...
140. Uterine Hæmorrhage (non-puerperal) ... ..	...	1	...	1	...	7	...
141. A.—Metritis ... ..	...	4	...	4	...	1	...
B.—Other affections of the Female Genital Organs ... ..	...	...	...	...	...	1	...
Displacements of Uterus ... ..	...	1	...	1	...	...	...
Amenorrhœa ... ..	...	...	...	...	...	10	...
Dysmenorrhœa ... ..	...	1	...	1	1	9	...
Leucorrhœa ... ..	...	...	...	...	...	1	...
Carried forward	25	994	32	1,019	23	4 874	5

TABLE V.—RETURN OF DISEASES AND DEATHS (EUROPEAN)

FOR THE YEAR 1926—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	25	994	32	1,019	23	4,874	5
VII.— <i>Diseases of the Genito-urinary System (non-Venereal)</i> —contd.							
142. Diseases of the Breast) non-puerperal)	1	...
Mastitis
Abscess of Breast	1	...
VIII.— <i>Puerperal State</i>							
143. A.—Normal Labour	1	...	1	...	2	...
B.—Accidents of Pregnancy
(a) Abortion	4	...	4	...	5	...
(b) Ectopic Gestation	1	...
(c) Other accidents of Pregnancy
144. Puerperal Hæmorrhage
145. Other accidents of Parturition
146. Puerperal Septicæmia
147. Phlegmasia Dolens
148. Puerperal Eclampsia
149. Sequelæ of Labour
150. Puerperal affections of the Breast
IX.— <i>Affections of the Skin and Cellular Tissues.</i>							
151. Gangrene	5	...
152. Boil—	18	...	18	...	145	...
Carbuncle	1	10	...	11	...	43	...
153. Abscess—	1	5	...	6	...	32	...
Whitlow	3	...	3	...	6	...
Cellulitis	1	38	...	39	2	97	...
154. A.—Tinea	184	...
B.—Scabies	1	...	1	...	39	...
Acne	4	...
155. Other Diseases of the Skin—	22	...
Brythema	1	...	1	...	21	...
Urticaria	43	...
Eczema	3	...	3	1	101	...
Herpes	1	...	1	...	29	...
Prickly Heat	5	...
Psoriasis	10	...
Elephantiasis
Myiasis	6	...
Chigoes	9	...
Cutaneous Leishmaniasis
Ulcers	3	...	3	...	29	...
X.— <i>Diseases of Bones and Organs of Locomotion (other than Tuberculous).</i>							
156. Diseases of Bones	4	...	4	...	...	...
Osteitis	2	...	2	...	5	...
157. Diseases of Joints—
Arthritis	5	...	5	...	45	...
Synovitis	3	...	3	...	16	...
158. Other Diseases of Bones or Organs of Locomotion	7	...	7	...	81	...
Carried forward	28	1,103	32	1,131	26	5,861	5

TABLE V.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.						OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.		TOTAL.	
		Admis- sions.	Deaths.				Cases treated.	Deaths.
Brought forward	28	1,103	32	1,131	26		5,861	5
XI.— <i>Malformations.</i>								
159. Malformations
Hydrocephalus
Hypospadias...
Spina Bifida, etc.
Paraphimosis	2	...	...
Phimosis	4	...	4	...	...	...	...
XII.— <i>Diseases of Infancy.</i>								
160. Congenital Debility
161. Premature Birth
162. Other affections of infancy
163. Infant neglect (infants of three months or over)
XIII.— <i>Affections of Old Age.</i>								
164. Senility
Senile Dementia
XIV.— <i>Affections produced by External Causes.</i>								
165. Suicide by Poisoning
166. Corrosive Poisoning (Inten- tional)
167. Suicide by Gas Poisoning
168. Suicide by Hanging or Stran- gulation
169. Suicide by Drowning
170. Suicide by Firearms	1	1	1
171. Suicide by cutting or stabbing instruments
172. Suicide by jumping from a height
173. Suicide by crushing
174. Other Suicides
175. Food Poisoning	2	...	2	...	4	...	...
Botulism	1	...	...
176. Attacks of poisonous animals								
Snake Bite	6	...	...
Insect Bite	17	...	...
177. Other accidental Poisonings	14	...	...
178. Burns (by Fire)	3	...	3	...	13	...	...
179. Burns (other than by Fire)	7	...	...
180. Suffocation (accidental)
181. Poisoning by Gas (accidental)	1	...	...
182. Drowning (accidental)
183. Wounds (by Firearms, war excepted)	1	...	...
184. Wounds (by cutting or stabbing instruments)	1	...	...	1	...	74	...	...
185. Wounds (by Fall)	1	25	...	26	1	152	...	...
186. Wounds (in Mines or Quarries)	3	...	...
187. Wounds (by Machinery)	1	...	1	...	8	...	...
Carried forward	30	1,138	32	1,168	27	6,165	6	6

TABLE V.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	30	1,138	32	1,168	27	6,165	6
XIV.— <i>Affections produced by External Causes—contd.</i>							
188. Wounds (crushing, <i>e.g.</i> railway accidents, &c.)	17	...	17	...	36	...
189. Injuries inflicted by Animals, Bites, Kicks, &c.	17	...
190. Wounds inflicted on Active Service	1	...	1	...	...	...
191. Executions of civilians by belligerents
192. A.—Over fatigue	2	...	2	...	1	...
B.—Hunger or Thirst
193. Exposure to Cold, Frost bite, &c.
194. Exposure to Heat— Heatstroke	4	...
Sunstroke	7	...	7	...	12	...
195. Lightning Stroke
196. Electric Shock
197. Murder by Firearms	1	...
198. Murder by cutting or stabbing instruments
199. Murder by other means
200. Infanticide (Murder of an infant under one year)
201. A.—Dislocation	6	...	6	...	9	...
B.—Sprain	5	...	5	...	56	...
C.—Fracture	16	2	16	...	12	...
202. Other External Injuries	12	...	12	...	247	...
203. Deaths by Violence of unknown cause
XV.— <i>Ill-Defined Diseases.</i>							
204. Sudden Death (cause unknown)
205. A.—Diseases not already specified or ill-defined—	...	23	...	23	...	14	...
Ascites	1	...
Edema	4	...
Asthenia	10	...	10	...	55	...
Shock
Hyperpyrexia
B.—Malingering	1	...
XVI.— <i>Diseases, the total of which have not caused 10 Deaths</i>							
...
Total	30	1,237	34	1,267	27	6,635	6

TABLE VI.

RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1926.

Diseases.				IN-PATIENTS.					OUT-PATIENTS.	
				Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
					Admis- sions.	Deaths.			Cases treated.	Deaths.
I.—Epidemic, Endemic, and Infectious Diseases.										
1.	Enteric Group—									
	(a)	Typhoid Fever	... ..	...	5	4	5	...	...	...
	(b)	Paratyphoid A.	... ..	...	3	2	3	...	...	...
	(c)	Paratyphoid B.	... ..	...	1	...	1	...	...	...
	(d)	Type not defined	... ..	...	2	2	2	...	1	...
2.	Typhus ... ..			...	...	...	...	...	...	...
3.	Relapsing Fever			7	136	21	143	1	671	86
4.	Undulant Fever ... ..			...	...	...	...	...	2	...
5.	Malaria—									
	(a)	Tertian ... ..	...	1	93	4	94	...	32	2
	(b)	Quartan ... ..	...	...	9	...	9	...	60	...
	(c)	Aestivo-autumnal ... ..	...	25	1,499	28	1,524	19	16,982	4
	(d)	Cachexia ... ..	...	...	10	1	10	...	356	1
	(e)	Blackwater ... ..	...	...	3	1	3	...	1	...
	Rheumatic Fever			1	...	...	1	...	...	...
6.	Smallpox ... ..			...	126	27	126	1	44	1
	Alastrim ... ..			...	131	26	131	1	5	...
7.	Measles ... ..			...	38	1	38	...	59	...
8.	Scarlet Fever ... ..			...	...	...	...	...	...	...
9.	Whooping Cough			1	3	1	4	...	148	1
10.	Diphtheria ... ..			...	...	...	...	...	...	...
11.	Influenza			19	405	46	424	8	1,468	...
12.	Miliary Fever ... ..			...	...	...	...	...	...	...
13.	Mumps ... ..			...	24	1	24	...	77	...
14.	Cholera ... ..			...	...	...	...	...	...	...
15.	Epidemic diarrhoea ... ..			...	...	...	...	...	47	...
16.	Dysentery—									
	(a)	Amœbic ... ..	...	12	841	102	853	11	1,413	...
	(b)	Bacillary ... ..	...	...	25	4	25	1	14	...
	(c)	Undefined or due to other causes ... ..	...	...	94	17	94	3	610	3
17.	Plague—									
	(a)	Bubonic ... ..	...	2	67	44	69	...	136	136
	(b)	Pneumonic ... ..	...	...	12	12	12	...	26	26
	(c)	Septicæmic ... ..	...	...	19	19	19	...	237	237
	(d)	Undefined ... ..	...	...	...	...	...	...	833	727
18.	Yellow Fever ... ..			...	...	...	...	...	...	...
19.	Spirochaetosis ictero-hæmorrhagica ... ..			...	...	...	...	...	...	...
20.	Leprosy			135	353	15	488	202	1,150	4
21.	Erysipelas ... ..			...	4	...	4	...	1	...
22.	Acute Poliomyelitis ... ..			...	17	6	17	2	...	...
23.	Encephalitis Lethargica ... ..			...	...	...	...	...	...	...
24.	Epidemic Cerebro-spinal Fever			3	116	77	119	...	26	16
25.	Other Epidemic Diseases			1	...	...	1	...	...	...
	(a)	Rubeola (German Measles) ... ..	...	...	4	...	4	...	20	...
	(b)	Varicella (Chicken-pox) ... ..	...	9	576	...	585	23	561	...
	(c)	Kala-azar ... ..	...	...	...	...	...	...	...	...
	(d)	Phlebotomus Fever ... ..	...	...	1	1	1	...	...	...
	(e)	Dengne ... ..	...	...	3	...	3	...	2	...
	(f)	Epidemic Dropsy ... ..	...	...	6	1	6	...	1	...
	(g)	Yaws ... ..	...	6	235	4	241	22	7,638	...
	(h)	Trypanosomiasis ... ..	...	9	30	7	39	3	268	...
Carried forward				231	4,891	474	5,122	297	32,899	1,244

TABLE VI.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	231	4,891	474	5,122	297	32,899	1,244
<i>I.—Epidemic, Endemic, and Infectious Diseases (contd.)</i>							
26. Glanders ... ..	...	...	...	...	...	...	...
27. Anthrax ... ..	...	...	...	...	...	...	...
28. Rabies ... ..	...	1	...	1	...	...	...
29. Tetanus	1	52	30	53	1	20	4
30. Mycosis ... ..	...	2	...	2	...	39	...
31. Tuberculosis, Pulmonary and Laryngeal	8	208	71	216	6	272	1
32. Tuberculosis of the Meninges or Central Nervous System ... ..	...	7	5	7	...	3	...
33. Tuberculosis of the Intestines or Peritoneum ... ..	...	3	1	3	2	8	1
34. Tuberculosis of the Vertebral Column ... ..	...	5	3	5	1	12	...
35. Tuberculosis of Bones and Joints ... ..	...	29	1	29	4	53	...
36. Tuberculosis of other organs—							
(a) Skin or Subcutaneous Tissue (Lupus) ... ..	...	1	...	1	...	1	...
(b) Bones ... ..	...	13	...	13	1	3	...
(c) Lymphatic System ... ..	...	8	2	8	...	55	...
(d) Genito-urinary ... ..	...	...	...	...	...	3	...
(e) Other Organs ... ..	...	12	1	12	2	11	1
37. Tuberculosis disseminated—	6	1	...	7	...	...	...
(a) Acute ... ..	...	12	2	12	...	15	...
(b) Chronic ... ..	...	8	1	8	2	28	...
38. Syphilis—							
(a) Primary	13	134	2	147	5	508	...
(b) Secondary	38	337	12	375	26	1,626	...
(c) Tertiary ... ..	...	123	4	123	15	301	1
(d) Hereditary ... ..	...	11	...	11	1	49	...
(e) Period not indicated ... ..	...	12	...	12	...	797	...
39. Soft Chancre	6	67	...	73	2	243	...
40. A.—Gonorrhœa and its complications	34	566	13	600	24	4,713	1
B.—Gonorrhœal Ophthalmia ... ..	...	23	...	23	1	136	...
C.—Gonorrhœal Arthritis ... ..	...	52	...	52	2	217	...
D.—Granuloma Venereum ... ..	...	2	2	2	...	9	...
41. Septicæmia ... ..	...	47	26	47	2	8	1
42. Other Infectious Diseases—	1	60	8	61	13	212	...
Trypanosomiasis ... ..	...	...	...	...	...	...	...
<i>II.—General Diseases not mentioned above.</i>							
43. Cancer or other malignant Tumours of the Buccal Cavity ... ..	...	1	...	1	...	4	1
44. Cancer or other malignant Tumours of the Stomach or Liver ... ..	...	8	4	8	...	4	...
45. Cancer or other malignant Tumours of the Peritoneum intestines, Rectum ... ..	...	2	...	2	...	6	...
46. Cancer or other malignant Tumours of the Female Genital Organs ... ..	...	4	...	4	..	4	...
47. Cancer or other malignant Tumours of the Breast ... ..	...	...	...	...	...	3	1
48. Cancer or other malignant Tumours of the Skin	2	30	1	32	1	4	...
Carried forward	340	6,732	663	7,072	408	42,256	1,256

TABLE VI.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1926—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	340	6,732	663	7,072	408	42,256	1,256
II.—General Diseases not mentioned above—continued.							
49. Cancer or other malignant Tumours of Organs not specified	2	31	9	33	1	14	...
50. Tumours non-Malignant	1	258	2	259	12	458	...
„ Malignant ... ..	...	1	...	1	...	...	...
51. Acute Rheumatism	3	58	...	61	1	1,165	...
52. Chronic Rheumatism ... ..	...	421	1	421	15	5,420	...
Debility ... ..	...	...	...	...	...	1	...
53. Scurvy (including Barlow's Disease) ... ..	...	3	...	3	...	1	...
54. Pellagra ... ..	...	...	...	...	...	1	...
55. Beri-Beri ... ..	...	12	2	12	1	6	...
56. Rickets ... ..	...	1	...	1	...	27	...
57. Diabetes (not including Insipidus)	...	2	1	2	...	6	...
58. Anaemia :—							
(a) Pernicious ... ..	...	2	1	2	...	20	2
(b) Other Anæmias and Chloro- sis	10	117	14	127	2	4,203	5
59. Diseases of the Pituitary Body ...	...	...	...	...	...	1	...
60. Diseases of the Thyroid Gland ...	...	...	...	...	...	6	...
(a) Exophthalmic Goitre	1	8	2	9	...	20	...
(b) Other diseases of the Thy- roid Gland, Myxœdema ... ..	...	24	2	24	4	28	...
61. Diseases of the Para-Thyroid Glands ... ..	...	3	...	3	...	...	...
62. Diseases of the Thymus ... ..	...	...	...	...	...	...	...
63. Diseases of the Supra-Renal Glands ... ..	...	...	...	...	...	...	...
64. Diseases of the Spleen	1	35	1	36	2	618	1
65. Leukæmia :—							
(a) Leukæmia ... ..	...	3	1	3	...	1	...
(b) Hodgkin's Disease ... ..	...	1	...	1	...	1	...
66. Alcoholism ... ..	...	1	...	1	...	3	...
67. Chronic poisoning by mineral sub- stances (lead, mercury, &c.) ... ..	...	...	...	...	...	1	...
68. Chronic poisoning by organic sub- stances (Morphia, Cocaine, &c.) ... ..	...	1	1	1	...	1	...
Chronic poisoning by organic sub- stances (Unknown origin) ... ..	...	...	...	...	...	38	...
69. Other General Diseases ... ..	...	2	...	2	...	11	...
Auto-intoxication ... ..	...	1	...	1	...	42	...
Purpura Hæmorrhagica ... ..	...	2	...	2	...	1	...
Hæmophilia ... ..	...	...	...	...	...	...	...
Diabetes Insipidus ... ..	...	...	...	...	...	...	...
III.—Affections of the Nervous System and Organs of the Senses.							
70. Encephalitis (not including En- cephalitis Lethargica) ... ..	...	10	3	10	1	381	...
71. Meningitis (not including Tuber- culous Meningitis or Cerebro- spinal Meningitis) ... ..	...	27	16	27	1	13	...
72. Locomotor Ataxia ... ..	...	6	1	6	...	1	...
73. Other affections of the Spinal Cord	1	4	...	5	...	2	...
Carried forward	359	7,766	720	8,125	448	51,747	1,264

TABLE VI.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1926—*continued*.

				IN-PATIENTS.				OUT-PATIENTS.		
Diseases.				Remaining in Hospital at end of 1925.	TOTAL.		Total Cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
					Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward				359	7,766	720	8,125	448	54,747	1,264
III.— <i>Affections of the Nervous System and Organs of the Senses—(contd.)</i>										
74. Apoplexy :—										
(a) Hæmorrhage ... ..				...	14	7	14	...	6	...
(b) Embolism ... ..				...	1	1	1	...	...	...
(c) Thrombosis ... ..				...	2	1	2	...	1	...
75. Paralysis :—										
(a) Hemiplegia				2	37	4	39	5	24	...
(b) Other Paralysis				4	62	11	66	6	41	...
76. General Paralysis of the Insane				...	6	2	6	1	...	...
77. Other forms of mental Alienation				117	62	15	179	136	82	1
78. Epilepsy				2	51	10	53	2	132	1
79. Eclampsia, Convulsions (nonpuer- peral) 5 years or over ... ..				...	...	...	...	...	...	...
80. Infantile Convulsions ... ..				...	4	1	4	...	16	1
81. Chorea ... ..				...	1	...	1	...	5	...
Neuralgia ... ..				...	6	...	6	...	51	...
82. A.—Hysteria ... ..				...	6	...	6	...	30	...
B.—Neuritis				1	56	...	57	2	603	...
C.—Neurasthenia ... ..				...	12	...	12	...	664	...
83. Cerebral Softening ... ..				...	2	...	2	...	...	...
84. Other affections of the Nervous System, such as Paralysis Agitans				3	31	...	34	1	304	...
85. Affections of the Organs of Vision :—										
(a) Diseases of the eye				1	42	...	43	9	363	...
(b) Conjunctivitis ... ..				...	179	...	179	2	4,384	...
(c) Trachoma ... ..				...	2	...	2	...	6	...
(d) Tumours of the Eye ... ..				...	1	...	1	...	5	...
(e) Other affections of the Eye				4	104	...	108	7	1,339	...
86. Affections of the Ear or Mastoid Sinus ... ..				...	68	...	68	1	3,933	...
IV.— <i>Affections of the Circulatory System.</i>										
87. Pericarditis ... ..				...	12	6	12	...	2	...
88. Acute Endocarditis or Myocarditis				...	12	3	12	...	18	...
89. Angina Pectoris ... ..				...	...	...	...	...	2	...
90. Other Diseases of the Heart :—										
(a) Valvular ... ..				...	11	4	11	...	15	...
Mitral				7	57	13	64	3	214	2
Aortic ... ..				...	35	8	35	...	92	1
Tricuspid ... ..				...	2	...	2	...	2	1
Pulmonary ... ..				...	4	1	4	...	13	...
(b) Myocarditis ... ..				...	47	9	47	4	34	...
91. Diseases of the Arteries :—										
(a) Aneurism ... ..				...	15	5	15	1	13	...
(b) Arterio-Sclerosis				1	3	...	4	...	20	...
(c) Other diseases				1	48	5	49	1	130	1
92. Embolism or Thrombosis (non- cerebral) ... ..				...	...	...	...	...	...	...
Carried forward				502	8,761	826	9,263	629	67,291	1,272

TABLE VI.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	502	8,761	826	9,263	629	67,291	1,272
IV.— <i>Affections of the Circulatory System—(contd.)</i>							
93. Diseases of the Veins:—							
Hæmorrhoids	2	46	1	48	...	487	...
Varicose Veins ... ..	...	6	...	6	...	16	...
Phlebitis ... ..	...	1	...	1	...	4	...
94. Diseases of the Lymphatic System—							
Lymphangitis	5	94	2	99	...	639	...
Lymphadenitis, Bubo (non-specific)	10	238	...	248	13	1,025	...
95. Hæmorrhage of undetermined cause ... ..	...	1	...	1	...	4	...
96. Other affections of the Circulatory System ... ..	...	26	4	26	...	62	...
V.— <i>Affections of the Respiratory System.</i>							
97. Diseases of the Nasal Passages—							
Adenoids ... ..	...	1	...	1	...	22	...
Polypus ... ..	...	...	...	...	...	12	...
Rhinitis ... ..	...	18	...	18	1	1,156	...
Coryza ... ..	...	4	...	4	...	1,067	...
98. Affections of the Larynx—							
Laryngitis	4	22	...	26	...	381	...
99. Bronchitis—							
(a) Acute	42	675	15	717	6	15,937	9
(b) Chronic	5	160	4	165	3	3,762	14
100. Broncho-Pneumonia	9	322	70	331	6	422	16
101. Pneumonia—							
(a) Lobar	14	510	171	524	8	286	7
(b) Unclassified	13	126	26	139	16	222	22
102. Pleurisy, Empyema	9	187	9	196	7	482	1
103. Congestion of the Lungs ... ..	...	5	2	5	...	58	...
104. Gangrene of the Lungs ... ..	...	2	1	2	...	...	...
105. Asthma ... ..	...	19	2	19	...	94	...
106. Pulmonary Emphysema ... ..	...	3	...	3	...	14	...
107. Other affections of the Lungs	4	13	1	17	...	53	...
Pulmonary Spirochætosis ... ..	...	5	...	5	...	5	...
VI.— <i>Diseases of the Digestive System.</i>							
108. A.—Diseases of Teeth or Gums—							
Caries, Pyorrhœa, &c.	3	56	1	59	...	2,693	1
B.—Other affections of the Mouth—							
Stomatitis	1	22	2	23	...	1,258	..
Glossitis, &c. ... ..	...	3	..	3	...	526	...
109. Affections of the Pharynx or Tonsils—							
Tonsillitis ... ..	...	56	...	56	...	783	...
Pharyngitis ... ..	...	17	...	17	...	426	...
Carried forward	623	11,399	1,137	12,022	689	99,187	1,342

TABLE VI.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1926—*continued*.

Diseases.				IN-PATIENTS.				OUT-PATIENTS.		
				Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
					Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward ...				623	11,399	1,137	12,022	689	99,187	1,342
VI.— <i>Diseases of the Digestive System</i> (contd.)										
110.	Affections of the Oesophagus ...			...	4	...	4	...	1	...
111.	A.—Ulcer of the Stomach ...			..	5	...	5	...	6	...
	B.—Ulcer of the Duodenum ...			...	9	4	9	...	...	...
112.	Other affections of the Stomach—									
	Gastro Enteritis ...			...	...	...	...	1	74	...
	Gastritis ...			...	103	4	103	2	1,387	...
	Dyspepsia, &c. ...			2	94	1	96	...	3,943	...
113.	Diarrhoea and Enteritis									
	Under two years ...			3	133	8	136	1	1,051	...
114.	Diarrhoea and Enteritis—									
	Two years and over ...			4	438	25	442	7	4,300	10
	Colitis ...			5	78	12	83	...	1,119	3
	Ulceration ...			...	5	...	5	...	62	...
114a.	Sprue ...			...	...	...	...	...	251	...
115.	Ankylostomiasis ...			4	341	13	345	16	326	2
116.	Diseases due to Intestinal Parasites—									
	(a) Cestoda (Tænia) ...			...	144	...	144	...	3,172	...
	(b) Trematoda (Flukes) ...			...	10	1	10	...	12	...
	(c) Nematoda (other than Ankylostoma) ...			...	14	...	14	...	101	...
	Ascaris ...			4	227	1	231	7	5,412	...
	Trichocephalus dispar ...			...	77	...	77	...	48	...
	Trichina ...			...	...	...	...	...	5	...
	Dracunculus ...			14	426	1	440	13	1,420	...
	Filaria ...			1	1	...	2	...	106	...
	Strongylus ...			...	5	...	5	...	4	...
	Oxyuris ...			...	2	...	2	...	103	...
	(d) Coccidia ...			...	...	...	...	...	...	...
	(e) Other parasites ...			...	8	...	8	...	141	...
	(f) Unclassified ...			...	14	...	14	...	77	...
	Intestinal Obstruction ...			...	2	2	2	...	2	...
117.	Appendicitis ...			1	19	3	20	...	21	1
118.	Hernia ...			57	923	52	980	54	871	...
119.	A.—Affections of the Anus,									
	Fistula, &c. ...			...	56	2	56	4	96	...
	B.—Other affections of the									
	Intestines ...			1	10	1	11	...	136	...
	Enteroptosis ...			...	1	...	1	...	2	...
	Constipation ...			...	433	...	433	1	17,387	...
120.	Acute Yellow Atrophy of the Liver ...			...	...	...	...	...	...	...
121.	Hydatid of the Liver ...			...	...	...	...	...	...	...
122.	Cirrhosis of the Liver—									
	(a) Other forms ...			3	37	10	40	1	25	...
	(b) Alcoholic ...			2	14	3	16	...	1	...
123.	Biliary Calculus ...			...	1	...	1	...	...	...
124.	Other affections of the Liver—									
	Abscess ...			...	44	5	44	1	11	...
	Hepatitis ...			3	51	3	54	5	128	...
	Cholecystitis ...			...	...	...	...	...	5	...
	Jaundice ...			3	67	4	70	...	229	1
Carried forward ...				730	15,195	1,292	15,925	802	141,222	1,359

TABLE VI.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1925	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	730	15,195	1,292	15,925	802	141,222	1,359
VI.— <i>Diseases of the Digestive System—(contd.)</i>							
125. Disease of the Pancreas ... ..	...	2	...	2	...	5	...
126. Peritonitis (of unknown cause) ...	2	36	15	38	1	36	...
127. Other affections of the Digestive System	6	58	5	64	...	805	...
VII.— <i>Diseases of the Genito-urinary System (non-Venereal)</i>							
128. Acute Nephritis	4	73	22	77	2	45	...
129. Chronic	2	39	8	41	2	34	...
130. A.—Chyluria ... ..	...	...	...	...	...	...	...
B.—Schistosomiasis ... ..	...	35	1	35	1	62	...
131. Other affections of the Kidneys— Pyelitis, &c. ... ..	...	26	5	26	...	56	...
132. Urinary Calculus ... ..	...	3	...	3	...	69	...
133. Diseases of the Bladder ... ..	...	...	...	...	...	...	...
Cystitis	4	60	...	64	5	342	...
Incontinence of Urine ... ..	...	6	1	6	...	2	...
134. Diseases of the Urethra— (a) Stricture	7	164	11	171	7	240	...
(b) Other	10	131	4	141	4	462	...
135. Diseases of the Prostate ... ..	...	...	...	...	...	...	...
Hypertrophy ... ..	...	1	...	1	...	1	...
Prostatitis ... ..	...	19	...	19	...	45	...
136. Diseases (non-Venereal) of the Genital Organs of Man—	...	...	...	...	...	...	...
Epididymitis	1	40	...	41	2	143	...
Orchitis	4	69	...	73	5	339	...
Hydrocele	12	203	4	215	6	299	...
Balanitis ... ..	...	19	...	19	...	7	...
Ulcer of Penis ... ..	...	59	...	59	1	142	...
Others ... ..	...	...	...	...	...	57	...
137. Cysts or other non-malignant Tumours of the Ovaries	1	35	3	36	1	37	...
138. Salpingitis ... ..	...	19	2	19	2	37	...
Abscess of the Pelvis ... ..	...	9	4	9	...	3	...
139. Uterine Tumours (non-malignant)	...	25	2	25	2	46	...
140. Uterine Hæmorrhage (non-puer- peral) ... ..	...	11	...	11	...	51	...
141. A.—Metritis	1	43	1	44	...	278	...
B.—Other affections of the Female Genital Organs—	2	18	...	20	1	194	...
Displacements of Uterus ... ..	...	23	...	23	...	79	...
Amenorrhœa ... ..	...	7	...	7	1	529	...
Dysmenorrhœa ... ..	...	26	...	26	...	691	...
Leucorrhœa ... ..	...	10	...	10	...	323	...
Other diseases	1	...	...	1	...	...	...
142. Diseases of the Breast (non-puer- peral)—	...	...	...	...	...	...	...
Mastitis ... ..	...	12	...	12	...	133	...
Abscess of Breast	1	4	...	5	...	37	...
Carried forward	788	16,480	1,380	17,268	845	146,951	1,359

TABLE VI.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1926—*continued*.

Diseases.				IN-PATIENTS.				OUT-PATIENTS.		
				Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
					Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward				788	16,480	1,380	17,268	845	146,951	1,359
VIII.— <i>Puerperal State.</i>										
143.	A.—Normal Labour	...	...	...	56	...	56	2	149	...
	B.—Accidents of Pregnancy	...	...	...	1	...	1	...	18	...
	(a) Abortion	...	...	...	56	5	56	1	96	...
	(b) Ectopic Gestation	...	...	...	1	...	1	...	5	...
	(c) Other accidents of Preg- nancy...	...	...	...	41	6	41	2	64	1
144.	Puerperal Hæmorrhage	...	...	...	5	...	5	...	2	...
145.	Other accidents of Parturition	...	...	...	108	18	108	4	37	...
146.	Puerperal Septicæmia	...	...	...	10	4	10	1	3	1
147.	Phlegmasia Dolens...	...	...	...	3	...	3	...	...	...
148.	Puerperal Eclampsia	...	...	...	2	1	2	...	1	1
149.	Sequelæ of Labour	...	...	...	5	...	5	...	58	...
150.	Puerperal affections of the Breast	...	...	...	...	...	...	...	4	...
IX.— <i>Affections of the Skin and Cellular Tissues.</i>										
151.	Gangrene	...	...	...	34	3	34	2	57	...
152.	Boil	...	...	...	1	...	149	...	2,194	...
	Carbuncle	...	...	...	36	4	36	...	213	...
153.	Abscess	...	...	...	26	10	445	18	2,571	...
	Whitlow	...	...	...	62	...	62	...	511	...
	Cellulitis	...	...	...	35	12	662	25	4,773	...
154.	A.—Tinea	...	...	...	1	...	47	1	3,788	...
	B.—Scabies	...	...	...	71	...	71	...	2,669	...
155.	Other Diseases of the Skin	...	...	...	4	...	45	5	989	...
	Erythema...	...	...	...	11	...	11	...	1,675	...
	Urticaria	...	...	...	1	...	11	...	270	...
	Eczema	...	...	...	1	...	53	...	2,570	...
	Prickly Heat	...	...	...	...	...	...	...	5	...
	Herpes	...	...	...	1	...	7	1	129	...
	Psoriasis	...	...	...	12	...	12	2	65	...
	Elephantiasis	...	...	...	17	4	190	15	185	...
	Myiasis	...	...	...	1	...	1	...	14	...
	Mycetoma	...	...	...	...	...	...	...	1	...
	Chigoes	...	...	...	27	...	27	...	300	...
	Bulbous Impetigo	...	...	...	1	...	1	1	106	...
	Cutaneous Leishmaniasis	...	...	...	5	...	5	2	...	...
	Ulcers	...	...	...	93	7	1,220	76	13,238	...
X.— <i>Diseases of bones and Organs of Locomotion (other than Tuber- culous).</i>										
156.	Diseases of Bones—	...	...	...	...	...	...	...	...	...
	Osteitis	...	...	...	4	3	86	5	278	...
	Periostitis	...	...	...	3	...	3	3	6	...
157.	Diseases of Joints—	...	...	...	...	...	...	...	...	...
	Arthritis	...	...	...	16	10	271	11	2,350	...
	Synovitis	...	...	...	...	1	136	6	375	...
	Myalgia	...	...	...	1	...	1	...	...	...
158.	Other Diseases of Bones or Organs of Locomotion	...	...	...	11	1	206	7	4,589	...
Carried forward				1,000	20,348	1,469	21,348	1,035	191,309	1,362

TABLE VI.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.						OUT-PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.		TOTAL.	
		Admis- sions.	Deaths.				Cases treated.	Deaths.
Brought forward	1,000	20,348	1,469	21,349	1,035		191,309	1,362
<i>XI.—Malformations.</i>								
159. Malformations—	...	10	...	10	...		28	...
Hydrocephalus	2	...	2	...		3	...
Hypospadias	2	...	2	...		2	...
Spina Bifida, etc.	1	...	1	...		4	...
Phimosis	17	...	17	...		59	...
Paraphimosis		35	...
<i>XII.—Diseases of Infancy.</i>								
160. Congenital Debility	1	1	1	...		25	...
161. Premature Birth	4	1	4	...		51	...
162. Other affections of infancy	8	5	8	...		125	...
163. Infant neglect (infants of three months or over)	...	24	...	24	...		32	3
<i>XIII.—Affections of Old Age.</i>								
164. Senility—	...	6	4	6	1		...	...
Senile Dementia	5	...	5	...		9	1
<i>XIV.—Affections produced by External Causes.</i>								
165. Suicide by Poisoning	1	1	1	...		1	...
166. Corrosive Poisoning (Intentional)
167. Suicide by Gas Poisoning
168. Suicide by Hanging or Strangula- tion	1	1	1	...		...	...
169. Suicide by Drowning
170. Suicide by Firearms
171. Suicide by cutting or stabbing In- struments	5	4	5	1		3	...
172. Suicide by jumping from a height
173. Suicide by crushing
174. Other Suicides	3	3	3	...		3	3
175. Food Poisoning—
Botulism
176. Attacks of poisonous animals
Snake Bite	33	6	33	...		86	2
Insect Bite	11	...	11	2		104	...
177. Other accidental Poisonings	11	4	11	...		37	...
178. Burns (by Fire)	5	99	10	104	5		815	2
179. Burns (other than by Fire)	13	1	13	...		185	...
180. Suffocation (accidental)
181. Poisoning by Gas (accidental)		6	...
182. Drowning (accidental)
183. Wounds (by Firearms, war excepted)	55	7	55	3		21	1
184. Wounds (by cutting or stabbing instruments)	17	594	34	611	27		6,269	...
185. Wounds (by Fall)	168	6	168	10		3,913	2
186. Wounds (in Mines or Quarries)	...	141	5	141	1		2,228	...
187. Wounds (by Machinery)	403	2	403	2		2,124	...
Carried forward	1,022	21,966	1,564	22,988	1,087		207,477	1,376

TABLE VI.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1926—*continued*.

Diseases.	IN-PATIENTS.					OUT PATIENTS.	
	Remaining in Hospital at end of 1925.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1926.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Brought forward	1,022	21,966	1,564	22,988	1,087	207,477	1,376
XIV.— <i>Affections produced by External Causes (contd.).</i>							
188. Wounds (crushing, <i>e.g.</i> railway accidents, &c.)	1	68	6	69	5	585	2
189. Injuries inflicted by Animals, Bites, Kicks, &c.	40	40	6	80	14	1,129	...
190. Wounds inflicted on Active Service ... ..	...	2	...	2	...	3	...
191. Executions of civilians by belligerents ... ..	...	...	...	...	...	...	...
192. A.—Over fatigue ... ..	...	7	...	7	...	1	...
B.—Hunger or Thirst ... ..	...	4	2	4	...	1	1
193. Exposure to Cold, Frost bite, &c. ... ..	...	...	...	...	...	...	...
194. Exposure to Heat—							
Heatstroke ... ..	...	...	...	...	...	...	...
Sunstroke ... ..	...	1	...	1	...	...	...
195. Lightning Stroke ... ..	...	...	...	...	...	...	...
196. Electric Shock ... ..	...	1	...	1	...	...	...
197. Murder by Firearms ... ..	...	...	...	...	...	...	...
198. Murder by cutting or stabbing instruments ... ..	...	...	...	...	...	...	...
199. Murder by other means ... ..	...	...	...	...	...	...	...
200. Infanticide (Murder of an infant under one year) ... ..	...	...	...	...	...	...	...
201. A.—Dislocation ... ..	...	11	...	11	...	48	...
B.—Sprain ... ..	...	34	...	34	3	687	...
C.—Fracture ... ..	...	246	32	246	28	327	...
202. Other External Injuries	58	838	17	896	56	18,252	27
203. Deaths by Violence of unknown cause ... ..	...	...	...	...	...	...	...
XV.— <i>Ill-Defined Diseases.</i>							
204. Sudden Death (cause unknown) ... ..	...	2	2	2	...	...	...
205. A.—Diseases not already specified or ill-defined— ... ..	...	...	...	...	...	7	...
Ascites	4	78	19	82	7	101	...
Edema ... ..	...	10	...	10	...	55	...
Asthenia ... ..	...	8	1	8	...	98	1
Shock ... ..	...	3	...	3	...	23	...
Ganglion and Cysts ... ..	...	...	...	...	...	29	...
Hyperpyrexia ... ..	...	72	1	72	...	87	1
Tyrexia of uncertain Origin ... ..	...	17	1	17	...	...	...
B.—Malingering ... ..	...	1	...	1	...	56	...
XVI.— <i>Diseases, the total of which have not caused 10 Deaths.</i>							
Total	1,125	23,409	1,651	24,534	1,190	228,966	1,408

XII.—SCIENTIFIC PAPERS.

CONTRIBUTED BY MEDICAL OFFICERS.

PRESSURE FISTULAE FOLLOWING PROTRACTED LABOUR.

DR. G. M. GRAY.

While parturition as a general rule occurs much more easily and naturally in the African negro than in Europeans, nevertheless protracted labour does occur not infrequently.

In the (usual) absence of skilled assistance in such cases, if the case ultimately terminates in delivery with survival of the mother the prolonged pressure effects result in the development of extensive fistulae and the condition of the patient lacking the amenities of civilisation becomes such that she is a misery to herself and a nuisance to her relatives and becomes in fact an outcast.

The fistulae seen are often of large size with much scar tissue and fixation and the usual operative procedures suggested and described in the standard works on the subject are quite inapplicable in many of these cases.

One is therefore driven, after a failure of the usual methods, to measures which are admittedly mutilating (in some cases), and entail risks which seem justified in the circumstances in that only thus can one assure a reasonable degree of comfort to the patient. One such method is that of substituting the anal for the vesical sphincter and this has been done in the cases of which details are given.

Apart from any immediate operative risks, the objection to this is, of course, ascending infection of the urinary tract. Collected records of such cases show that usually this ultimately occurs possibly only after a period of years, during which the patient has remained apparently in good health, has been rendered comfortable and has been enabled to lead a normally active life.

Where the natural opening of the ureter into the bladder is undisturbed as in Case 1 this risk is understood to be minimised, because of the presence of the ureteric sphincter. In the method employed for Case 2 an attempt is made to supply such a sphincter by implanting the ureter obliquely and embedding it in the wall of the bowel.

Case 1.—A young Egba woman, primipara, commenced to pass faeces per vaginam shortly after parturition. When seen, her general condition was poor; she was thin, feeble and anaemic; extensive excoriation and sepsis of skin of buttocks and thigh. The local condition was (a) a rectovaginal opening about the size of a shilling high upon the posterior vaginal wall; rectal sphincter intact; (b) a large vesico-vaginal opening extending forward to urethra and involving sphincter of bladder; both ureters visible per vaginam at the posterior margin of the opening.

There was a very considerable degree of fixation of the parts from scarring.

10.11.20.—Left lumbar colotomy as a preliminary measure.

17.2.21.—General condition much improved. Laparotomy (median subumbilical incision); to gain access to the rectovaginal opening it was necessary on account of adhesions and fixation of uterus to perform hysterectomy, split the cervical stump posteriorly and divide the vaginal vault by two lateral incisions. The resulting exposure allowed of the margins of the fistula being pared and sutured: operation was completed by suture of the uterine stump and closure of the abdominal wound in the usual manner.

31.3.21.—The operation taxed patient considerably and convalescence was slow: examination on this date showed the condition of the rectovaginal opening to be practically unchanged.

27.5.21.—Fistulous opening between vagina and rectum enlarged and a large tube passed from anus through fistulous opening into upper part of vagina : colpocleisis.

23.7.21.—Colotomy closed, suture of margins after freeing the loop : wound closure with drainage.

1.9.21.—Patient discharged from hospital : general condition good ; anal sphincter competent, bowel being evacuated at intervals of six hours or thereby.

Case 2.—Patient, a young Yoruba woman developed incontinence of urine after a protracted labour.

On examination the condition found was as follows :—

(1) Rectovaginal fistula : a small opening (almost large enough to admit the stem of a lead pencil) high up in the posterior fornix.

(2) Vesicovaginal fistula : a large transverse gap admitting easily three fingers and extending forward to involve junction of bladder and urethra : ureteric orifices intact.

There was much cicatricial contraction of upper part of vagina with fixation of uterus : the anterior part of bladder with this margin of fistulous opening was adherent to pubis.

14.10.24.—Examination under an anaesthetic confirmed the finding as to fixation of uterus, which could not be drawn down so as to give any degree of exposure of the fistulous opening. Operation from below appeared quite impracticable.

Laparotomy (median subumbilical incision).

(a) Closure of rectovaginal opening : transverse incision in peritoneum at bottom of pouch of Douglas, separation of vagina and rectum until gap in each was apparent, margins of these openings pared, and then approximated by an inverting suture of catgut : the openings in vagina and rectum were sutured separately, and peritoneum loosened and tacked down so as to interpose a double layer between rectum and vagina at site of suture.

(b) Exploration of vesicovaginal opening. Bladder opened freely, margins of fistula pared and an attempt made at suture after freeing the parts : the margins were brought together at each side for a short distance but complete closure was found impossible owing to size of gap and fixation : bladder drained suprapubically and abdomen closed.

4.11.24.—Examination per vaginam and by sigmoidoscope showed complete closure of rectovaginal opening. The gap in base of bladder was not appreciably diminished : suprapubic wound allowed to close.

13.11.24.—Laparotomy (left paramedian incision) : transplantation of left ureter into lower part of sigmoid. Procedure adopted was that of Stiles as described in Binnie's "Operative Surgery." Access was rendered difficult by extensive adhesions of left uterine appendages (with a cystic ovary) : closure of abdominal wound in layers. For three days after operation there was slight irregular pyrexia : little general disturbance and wound healed by primary union.

30.12.24.—Patient's general condition has remained satisfactory, no pyrexia, no tenderness in left lumbar region, or appreciable enlargement of kidney : activity of the organ shown by discharge of urine per rectum.

Laparotomy (right paramedian incision) transplantation of right ureter into sigmoid: procedure as before facilitated by absence of adhesions and healthy condition of uterine appendages on this side.

8.1.25.—Little constitutional disturbance after operation: stitches out on this date, wound having healed per primam. Bowels loose and acting frequently, sphincter competent.

18.1.25.—Discharged from hospital: general condition satisfactory, looks well nourished and appetite is good: no pyrexia, no tenderness in lumbar regions although slight backache mentioned. Bowels evacuated every four to six hours.

Since discharge from hospital patient has been seen frequently the last occasion being about six months after the second transplantation operation: she looks healthy and well nourished and appears to be well.

Bowels act about every six hours but sphincter is quite competent and she keeps dry and is able to live an active life.

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Stiles—Transactions of American Surgical Association, 1911.

MODIFIED HIRSCHSPRUNGS DISEASE.

DR. G. M. GRAY,

„ A. BLAIR AITKEN and

„ H. H. STEWART.

Mr. C.T., a European, aged thirty-three, was admitted to the European Hospital, Lagos, on 29th December, 1926. He was sent from Port Harcourt by Dr. Miller who reported that Mr. C.T. had been suffering from abdominal colic of over two years duration. The patient had consulted many doctors and several diagnosis had been made. Dr. Miller reported that two of the attacks which he had seen simulated typical biliary colic but there had been no jaundice and his personal opinion was that the attacks were due to adhesions or stricture of the gut. At no time had the attacks resembled an acute abdomen.

Past history.—The illness began over two years ago with a feeling of occasional discomfort in the abdomen. This discomfort at first was generalised and patient was very constipated, later the attacks became acute and frequent and the colicky pain tended to be localised on the right side of the abdomen. There has never been any vomiting or jaundice. Of late the condition has been almost constantly present, and anaemia and constipation have been marked and loss of weight.

Present condition.—A fairly well-developed but somewhat emaciated man decidedly under weight. Teeth, mouth, throat, negative, no jaundice. Tongue coated.

Chest.—Negative.

Abdomen.—No swelling, slight tenderness in right rectus about level of umbilicus. Pain complained of at same point.

Urine.—Acid 1,028. No albumin, no sugar.

Blood.—Negative for malarial parasites, no leucocytosis.

Stool.—Negative for parasites and blood.

4.1.27 operation.—Preliminary morphine. Right paramedian incision. The whole of the colon was found much enlarged, the caecum and ascending colon being especially bulky and the former hanging down into the pelvis. The transverse colon also extended into the pelvis and the condition resembled closely Hirschsprung's disease.

The appendix was removed, the caecum and ascending colon plicated to reduce their bulk and stitched to the lateral abdominal wall so as to remedy the sag into the pelvis. The wound was closed in layers.

The wound healed per primam and the patient left hospital on 27th January, 1927 with complete cessation of all his symptoms, eating well, bowels acting normally and feeling well. It was explained to him that further operative interference might be necessary.

X RAY EXAMINATION BY DR. H. H. STEWART—SPECIALIST.

Mr. C.T. was sent on the 30th December, 1926, from the European Hospital with the suggestion that there might be some kidney condition to account for his symptoms.

The examination carried out with the aid of the Potter Bucky diaphragm proved negative and accordingly it was arranged to examine the whole intestinal tract by means of the opaque meal.

On the 31st December, he was given a standard meal and examined on the vertical screen, all observations being carried out in the vertical position.

The stomach was seen to fill in a normal manner, it was not enlarged nor abnormal in shape.

Peristalsis was well marked and there was no delay in time of emptying which was normal.

There was no evidence of gastric or duodenal ulcer.

At four hours the caecum began to fill and it was at once noticed that it was distended and very mobile. At no time was the quantity of opaque meal present in sufficient bulk to outline completely the caecum. It was only by palpation that the caecum boundaries could be determined.

This is shown in Fig. 1, the large white area indicating the site of the caecum.

At nine hours the filling continued into the ascending colon which in this case was found to lead downwards into the pelvic cavity.

The colon appeared quite mobile and there were no signs of any adhesions.

The condition at this time is shown in Fig. 2.

The filling continued slowly and it was apparent that the whole of the transverse colon also was in the pelvis.

At the end of twenty-eight hours the condition was that shown in Fig. 3, where the whole colon is seen to be lying in the pelvis with a marked degree of intestinal stasis, the opaque meal being still seen at the caecal-end of the colon.

The X-ray findings were subsequently confirmed at the operation.

R

FIG. 1.

L



Barium meal reaching enlarged caecum distended by gas four hours after meal.

R

FIG. 2.

L

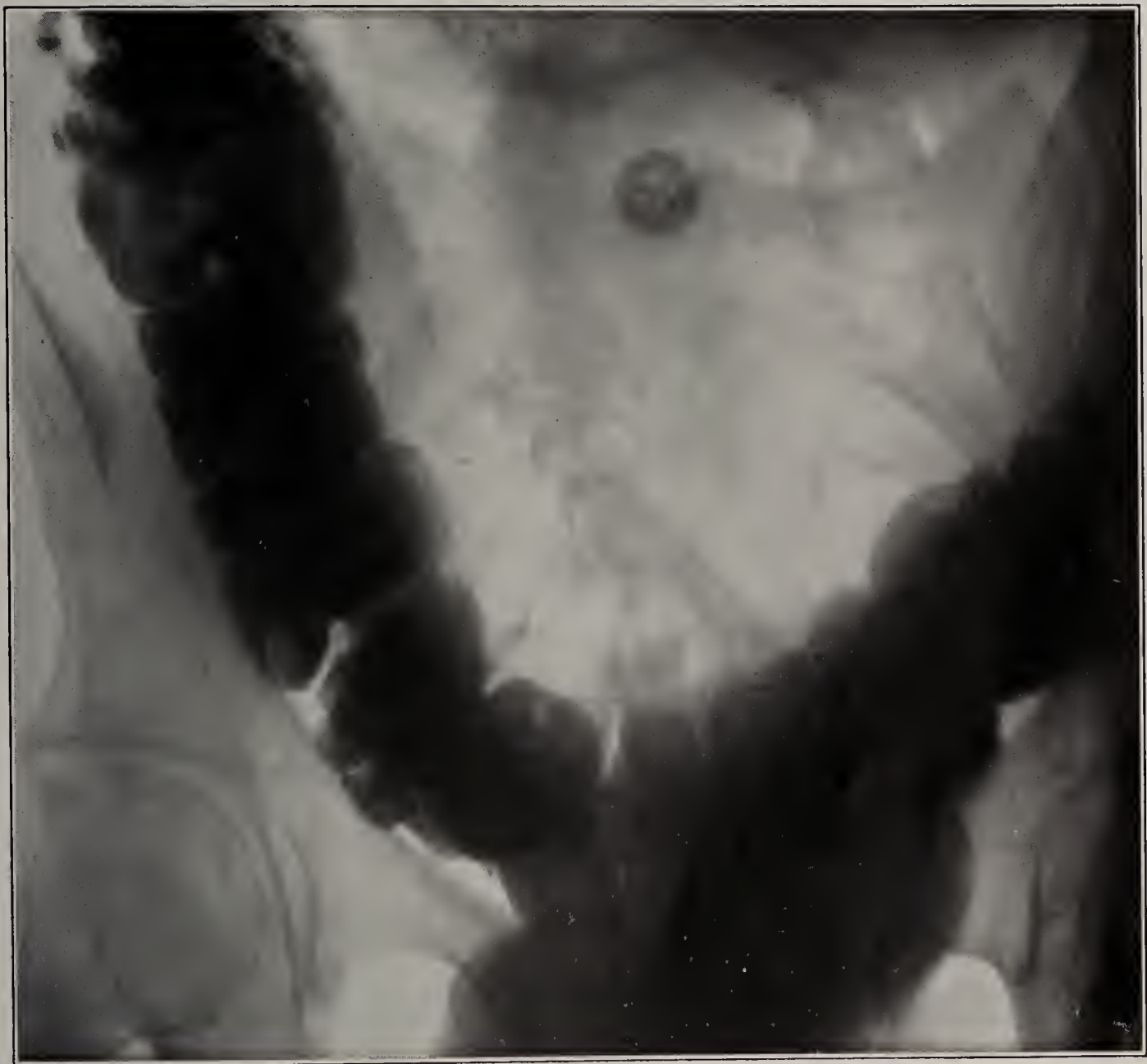


ASCENDING COLON FILLING IN DIRECTION OF PELVIC CAVITY
NINE HOURS AFTER MEAL.

R

FIG. 3.

L



Ascending, transverse and descending, colon filled and lying in pelvic basin
twenty-eight hours after meal.

GOITRE IN AFRICAN NATIVES.

DR. E. C. BRAITHWAITE—*Specialist.*

These brief notes on this interesting subject are submitted as eight patients have presented themselves at Warri Hospital with this condition during the past year requesting surgical treatment.

Four were females and four males. The youngest patient was a boy aged thirteen years and the oldest a woman aged forty-eight years. The female cases showed a greater general involvement of the gland.

Three of the patients were natives of the Sabongida country, two were from Ifon and one from Asaba. The remaining two were inhabitants of the Eastern end of the Warri Division near Kwale. Thus the bulk of the patients came from districts well away from the sea and of a hilly nature.

This is of interest because goitre is prevalent in such hilly parts of the world as the Alps, the Himalayas, the Carpathians, Pyrenees and in Derbyshire. It is rare in lowlying countries near the sea such as Malaya and this appears to apply to Nigeria, and although the former belief in the causative influence of altitude and distance from the sea has lately undergone some modification, nevertheless the condition is associated with geographical and geological conditions.

CAUSATION.

There are now only two predominant theories. The one developed from empirical observation of endemic incidence is named the Iodine Deficiency theory. Preventive and curative work is now being undertaken on these lines with good results in the Swiss endemic area and in certain parts of the United States of America where iodised table salt is in use.

The other is the organismal theory which its supporters have had to modify in so far that whilst they admit that the deficiency of iodine is the proximate cause of goitre yet they claim that the existence of such deficiency is dependent on and primarily due to the faecal organism or organisms which have been proved to produce goitre when administered by mouth in culture or otherwise. According to the Iodine Deficiency theory there is a natural lack of iodine in the food or water of certain localities; according to the Micro-organism theory the lack of iodine is not a deficiency natural to the food or water but is an artificial one produced by the active intervention of faecal organisms which have been ingested.

Certain fats and oils when taken in excess prevent the system from absorbing sufficient iodine from a diet which contains it in sufficient amount. On the other hand others, of which cod liver oil is the best known, while they exercise a detrimental effect qua oil on the absorption, nevertheless because of their iodine content are not only incapable of producing goitre but are even capable of preventing its development in animals fed on faecally infected food, a diet which would certainly produce goitre in the absence of some such vehicle as iodine.

CONSIDERATION OF THESE FACTORS IN REGARD TO NIGERIA.

The disease appears to be definitely associated with geographical conditions in as much as most of the cases are found in hilly districts.

Women are more affected than men and certain occupations of women, such as washing clothes, bathing children, necessitate more prolonged contact with water. Faecal contamination of water supplies is considered the greatest single factor in the causa-

tion of the disease and how large a percentage of drinking water supplies are so infected it would be difficult to say but from the very nature of such supplies, streams—also used for latrine purposes, wells—in proximity to salgas, it must be considerable.

Diet which is varied can scarcely be said to have much influence in its causation and that of heredity is difficult to estimate. Septic foci especially in the mouth and nose may result in thyroid enlargement but such foci are more common in coast dwellers who have forsaken their indigenous foodstuffs to some extent and now partake of imported provisions rather than among the inhabitants of the hinterland who furnish the bulk of the cases of goitre.

No definite cases of hypothyroidism such as myxoedema or cretinism have been met with in this country this being possibly due to the fact that abnormal children in Nigeria do not receive the care which ensures their survival.

NATIVE OPINIONS WITH REGARD TO THE DISEASE.

These may be briefly summarised :—

- (a) That it belongs to certain areas.
- (b) That once fully developed it never goes away.
- (c) That it is not transmitted from husband to wife.
- (d) That it arises from drinking certain waters.

EFFECTS OF GOITRE.

To get an accurate account of symptoms is difficult nevertheless the condition appears to produce an impairment of usefulness of the individual. Fatigue on exertion is more rapidly shown than in normal individuals. As the disease progresses pressure symptoms ensue.

In two of the present series of cases symptoms of hyperthyroidism such as tachycardia were noted both patients being females over forty years of age.

Disfigurement, however, was the main cause of the patients seeking relief.

PREVENTION.

As heavy faecal contamination of water supplies is considered to be the greatest factor in the causation of the disease therefore efforts should be made to produce a material and permanent change in the practices of the inhabitants of the endemic areas particularly with regard to drinking water supplies and the disposal of excreta.

TREATMENT.

The only native treatment appears to be scarification which has little effect on the enlargement.

1.—PROPHYLACTIC.

As deficiency of iodine in the system with a resulting excessive stimulation of the thyroid gland to form thyroid-iodine or thyroxin is the proximate cause of goitre and as good results are reported from the introduction of iodine in some form into table salt, an attempt on these lines could be initiated here as practically all the salt consumed is imported.

2.—SURGICAL.

Intervention is called for when the gland is extensively enlarged and is usually asked for by these patients. Important points in this respect are :—

- (a) Careful preparation of the patient.
- (b) Speed without undue haste in operating.
- (c) Minimise the loss of blood.
- (d) Avoid the recurrent laryngeal nerves.
- (e) Leave a portion of one lobe, preferably the lower pole when the whole gland is involved, to avoid surgical cachexia strumipriva.
- (f) Provide free drainage afterwards.

TUMOUR DUE TO THE ONCHOCERCA VOLVULUS.

A boy residing at the Government School, Warri, a native of Benin City, presented himself at the hospital on the 11th of July last complaining of a small hard tumour, about the size of a pigeon's egg, situated in the midfrontal region of the scalp. The history elicited was that it had been present about six months and had been preceded by irritation. Native medicine men had well scarified the skin without getting rid of the swelling.

It was situated under the occipito-frontalis aponeurosis and was not tender or painful. On removal it appeared to be a hard fibroma. The Director of Medical Research Institute, Yaba, was kind enough to make sections and to report as follows :—

“ The tumour is composed of fibrous tissue containing cyst-like spaces in which are seen sections of a tube-like structure. This is undoubtedly an adult filaria and the condition is a so-called *Onchocerca volvulus tumour*. ”

SARCOMA OF RIBS.

An elderly man, not less than sixty years of age, presented himself on the 13th of July last with a large solid elongated sausage-shaped tumour lying obliquely along the ninth and tenth left ribs to which it was firmly adherent. It was not tender or painful and was said to have been present for about five years. The patient's general conditions was fair and there were no signs of secondary deposits in the lungs, liver or lymphatic glands of groin axilla or posterior triangles of the neck.

He desired its removal which was done two days after admission through a ten inch oblique incision along the course of the tumour. It was firmly adherent to the ninth and tenth ribs and portions of these were excised with the tumour. The growth had not invaded the left pleura.

A portion of the neoplasm was forwarded to the Director of Medical Research Institute, Yaba, for section who kindly reported as follows :—

“ The sections confirm your diagnosis.
The tumour is a round-celled sarcoma. ”

ACUTE INVERSION OF THE UTERUS WITH PROLAPSE.

The comparative rarity of this condition and the absence of the usual shock associated with collapse is the reason for reporting it.

The patient, a strong healthy woman aged twenty-five years, who had borne two children previously, gave birth on the 21st of May to a full term male child naturally. As the placenta did not come away within a short period the handy woman in attendance pulled on the cord and removed it by this method, but a mass followed and protruded outside the vulva which alarmed the handy woman and husband who caused the patient to be sent into hospital.

On admission two hours after the event, the internal surface of the uterus was protruding outside the vulva. The general condition of the patient was good and there was no obvious shock or collapse present.

Chloroform was immediately given and the protruding mass was well cleansed with antiseptics. The fundus was then compressed with a large abdominal swab and replaced by firm pressure with the closed fist.

After replacement a hot vaginal douche was given and the vagina packed and a firm abdominal binder applied. Recovery was uninterrupted and the patient left hospital four days after admission.

LARGE INGUINAL HERNIAE.

From time to time patients, generally elderly men, present themselves for treatment with large inguinal herniae which have been present for years and have gradually increased in size so that in some cases at least one-half of the bowel is present in the sac. In many the contents of the sac are irreducible through adhesions between themselves and the sac wall.

After trying various methods of operation the only satisfactory one, in so far as one is able to judge permanent results in this country owing to the lack of follow-up facilities, has been as follows:—

A sufficiently large oblique incision is made over the inguinal canal extending well down into the scrotum to give a good exposure. The external oblique tendon, generally greatly attenuated, is slit up and the sac opened. If the contents are not adherent they are replaced into the abdominal cavity. If not and separation is fairly easy this is proceeded with, and the raw surface of bowel is peritonised before replacement into the abdomen. If adhesions are general then the adherent bowel is excised and continuity restored by lateral anastomosis. If the bladder, as it occasionally happens, is present in the inner wall of the sac it is dissected free and replaced into the pelvis. Part of the bladder is never excised.

The next step is to sew up the opening in the peritoneum and remove the sac. The spermatic cord is then transfixed high up and the testicle and as much of the cord as possible removed.

The inguinal canal is now completely obliterated by suturing the internal oblique muscle and conjoined tendon to the deep surface of Poupart's ligament. The external oblique tendon is imbricated and a further support is occasionally provided by turning down a flap from the anterior sheath of the rectus muscle and suturing it to the anterior surface of Poupart's ligament.

This method has given better results than the use of filigrees which are apt to suppurate.

The patients are advised to wear a light truss for some months after the operation, but even with this there is no question that the operation confers a great boon on elderly patients.

A photo is attached showing a typical case before and after operation.

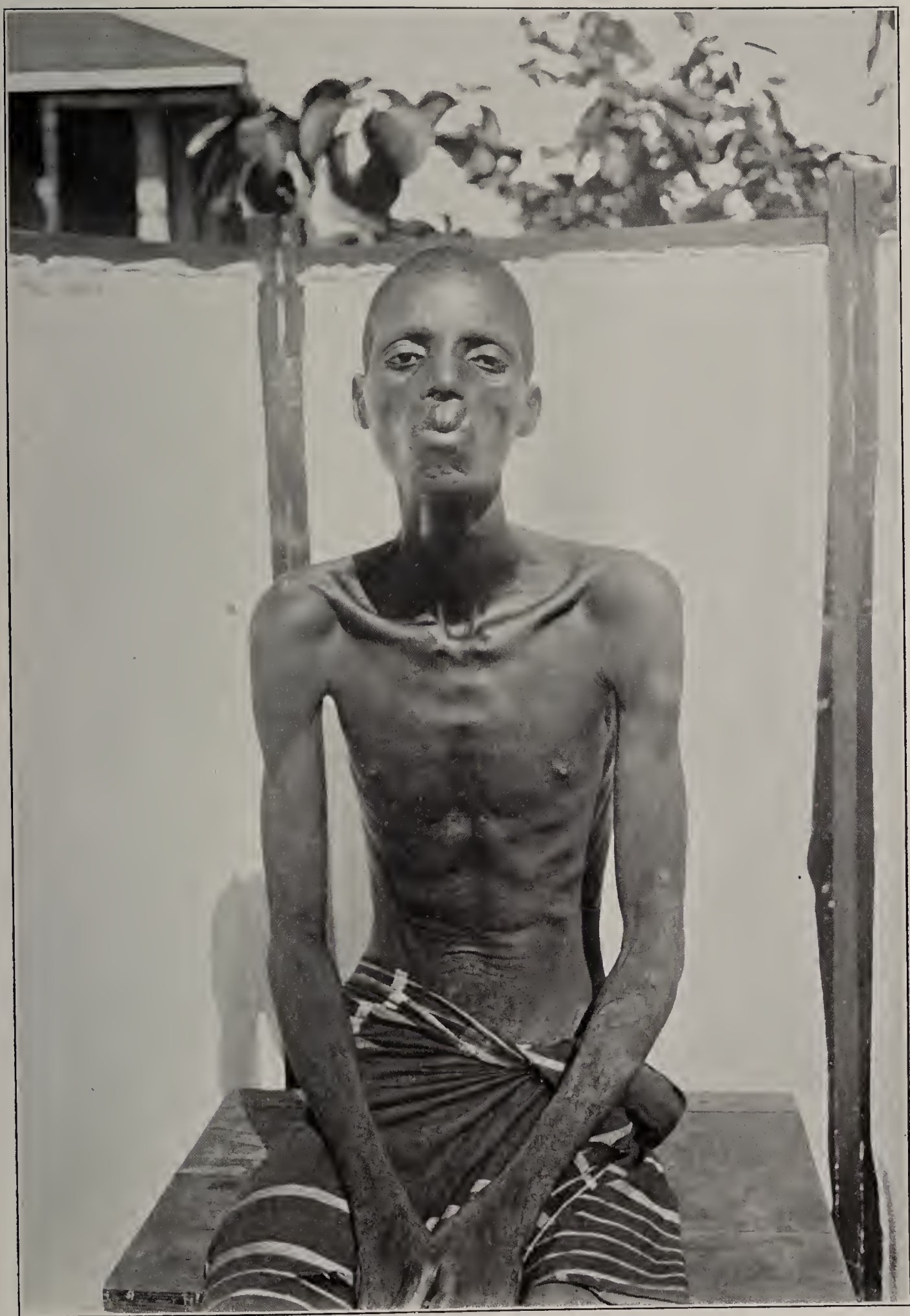


Before Operation.

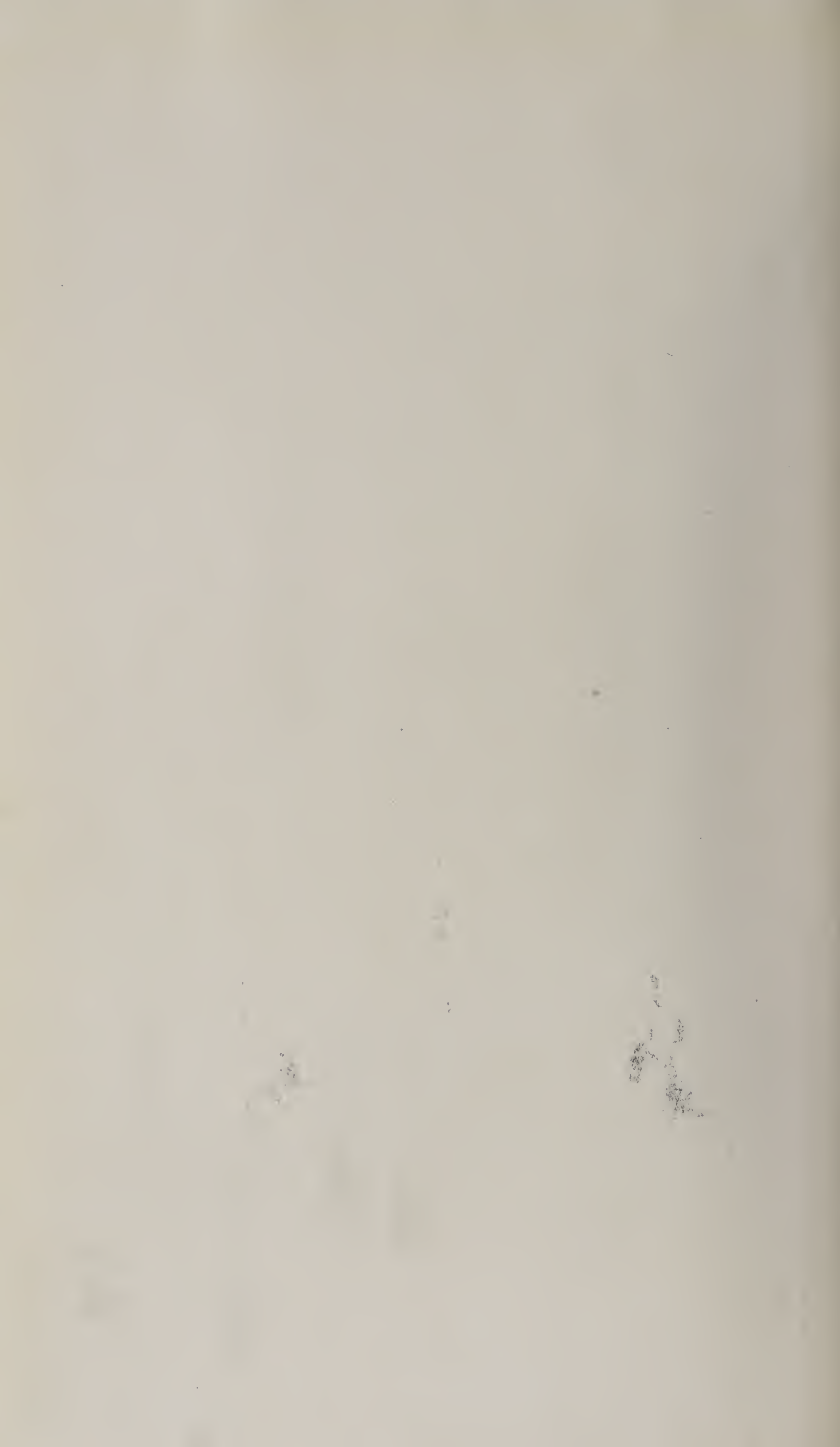
LARGE HERNIA.



After Operation.



CICATRICAL CLOSURE OF THE MOUTH.



CASE OF SQUAMOUS CANCER.

The patient, by name Ofodie, aged about thirty-three years, a native of the Warri District, was admitted to the Warri Hospital on the 16th of October last complaining of an ulcer on the left side of the neck just below the ear.

This had been present for over six months and despite "native treatment" was getting bigger. The patient was a well developed man who said he had lost no flesh recently and his appearance did not belie this. There was no history of previous syphilis.

On examination there was an ulcer $3'' \times 2''$ with growth in excess of destruction, and everted edges situated just below the left ear and extending forwards as far as the angle of the jaw. No enlarged lymphatic glands could be detected in the left side of the neck.

The growth was widely and deeply excised and the wound edges approximated as far as possible.

A small portion was forwarded to the Director of Medical Research Institute, Yaba, who kindly reported as follows:—

"Squamous cancer. A well marked case showing considerable invasive tendency."

Convalescence was uninterrupted and he was discharged from hospital on the 28th October with the wound all but healed and subsequently attended as an out-patient for ten days and by this time healing was complete.

CASE OF CICATRICAL CLOSING OF THE MOUTH.

DR. F. ROSS—*Senior Medical Officer.*

Case of cicatrical closing of the mouth, four months' duration. On admission it was just possible to pass a fine probe into the mouth. The upper lip and right ala nasi showed a little ulceration.

The interesting point is that for three months the patient had been living on palm wine taken in partly by the nose and partly through the very small fistula. With a feeding cup he would place the spout on the opening and then suck hard—a very tedious process. Naturally on such a diet he was greatly emaciated. Chloroform given, a probe passed and dense scar tissue cut through, almost half-an-inch thick, and the mouth reconstructed. Neokharsivan was given and healing was rapid and uneventful.

MALIGNANT DISEASE IN MALE ABOUT EIGHTEEN.

Malignant disease in a male aged eighteen. Admitted to hospital 31st March, 1926 with a swelling the size of a duck's egg over the right lower ribs.

History of six months' duration.

1st April.—Swelling cut down on and found to be suspicious of malignant disease. Haemorrhage was profuse and difficult to arrest.

Report from Yaba "glandular cancer probably originating in liver or pancreas."

31st May.—When photographs were taken, the lower part of operation wound had healed. At the upper part there is now a tumour twice the size of one's fist. Liver and spleen are as outlined by chalk mark. The tumour is well seen in the side-view photograph. Patient has only lost a little weight and leaves the hospital at his own request. He is attending as an out-patient.

RIGHT ARM ADHERENT TO CHEST WALL.

A prisoner with right arm adherent to chest wall following burns in childhood.

A plastic operation was done and the arm freed, much of the scar tissue being excised.

GLANDULAR CANCER OF LIVER IN BOY OF NINE.

Swelling on the right side of the abdomen was visible. It reached down to the right iliac fossa where the liver border was easily felt and almost to the middle line. At a point corresponding to a little below the rib margin (the light pitch in photograph) fluctuation was found.

A small skin incision was made under chloroform and the swelling aspirated. It was then seen that this was a cavity containing blood. Accordingly the opening was enlarged and a finger introduced. The cavity extended down to the iliac fossa with firm bands across it in several places. The child's general condition was very bad and he died a few hours afterwards.

Postmortem.—The above features were confirmed and specimens cut and sent to Yaba. Report "glandular cancer of the liver." The age of the patient makes this case very interesting.

No history of injury or dysentery.

MALIGNANT TUMOURS.

DR. H. R. M. FERGUSON—*Medical Officer.*

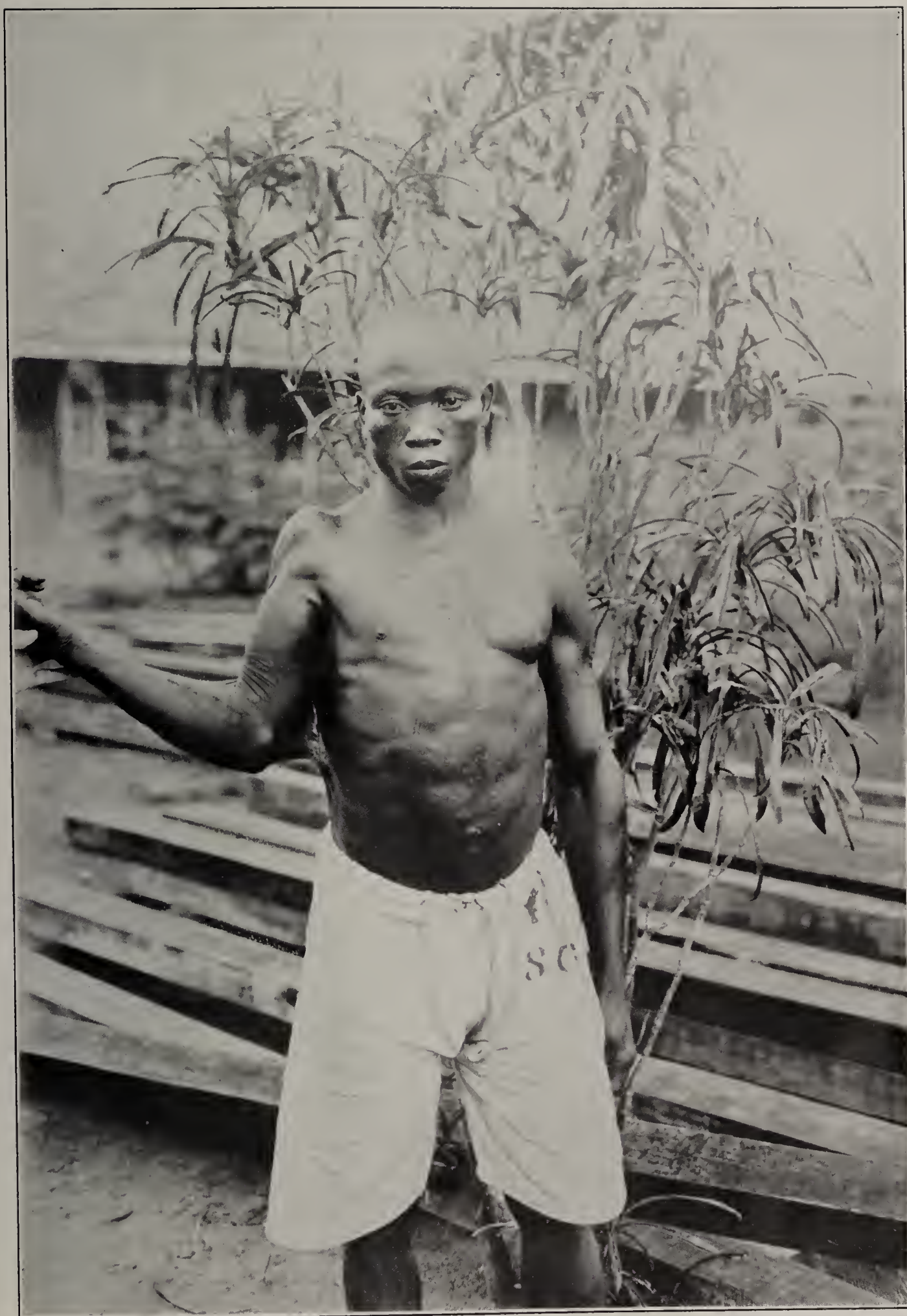
The following malignant tumours have been reported on by the Pathologist, Yaba.

- 1.—Rodent ulcer commencing in the eyelid—eye destroyed and walls of orbit invaded.
- 2.—Fibro-sarcoma from sheath of rectus.
- 3.—Adeno-carcinoma of testis.
- 4.—Small round-celled sarcoma of upper arm seen in consultation with Dr. Maples (photograph).
- 5.—Squamous carcinoma of scalp—seen in consultation with Dr. Maples and Dr. Smith—Pathologist.
Dr. Smith was of opinion that this condition possibly commenced as a rodent ulcer, and developed subsequently into true carcinoma—(photograph).

CASE OF ECTOPIC PREGNANCY.

The patient arrived in hospital with a large irregular abdominal tumour and a deep abscess of the neck.

There was no history of pregnancy, nor suspected pregnancy, the patient stating that the tumour had been present for two years. The abscess was first treated, and after recovery the abdomen was opened.



CICATRICAL ADHESION DUE TO BURN.



GLANDULAR CANCER OF LIVER.



CONGENITAL MALFORMATION OF EYE. FAILURE OF
DEVELOPMENT OF OPTIC VESICLE.



CONGENITAL MALFORMATION.



SQUAMOUS CARCINOMA.
Examined by Dr. Smith.

The tumour was surrounded by adherent omentum, and bowel. The appendix also was firmly bound down to it, and had to be removed. After clearing the tumour of adhesions, it was seen to be a left pregnant tube. A necrotic full term foetus was removed, and the greater part of the tube resected.

Recovery uneventful.

PREGNANT FIBROID UTERUS COMPLICATED BY OVARIAN CYST.

The patient arrived pregnant and stated that she had passed full term. A fibroid uterus was present tilted to the right by a left ovarian cyst—the presentation was a breech which had not engaged in the brim.

The patient was suffering from bronchitis on admission and the general condition was poor. But as rupture of the uterus was threatening an emergency laparotomy was performed. The child in a condition of blue asphyxia was removed from the uterus and the ovarian cyst and uterus which was thoroughly diseased were then removed.

The patient recovered from the operation, and also from a severe attack of broncho-pneumonia.

The child did well.

PRIMARY CHRONIC GLAUCOMA.

This disease in the European is a disease of middle life as a rule.

In the African in this part of the country it occurs early. A case shown to Dr. Smith—Pathologist—is typical. A boy aged ten complains that “his eyes are dark when the sun gets up.”

External examination of the eye shows a sluggish pupil slightly dilated. He reads 6/6 Snellen type with ease. Retinoscopy shows no error of refraction, but when light is thrown into the eye the pupil tends to dilate, and remains dilated, showing a want of balance between the third cranial nerve and the sympathetic.

Ophthalmoscopy shows slight cupping of the right disc and very marked cupping of the left—the picture being typical of glaucoma.

With this as a starting point every stage of the disease up to complete atrophy of the discs, and fixed dilated pupil is frequently seen. This advanced stage of the disease was observed in a clerk aged about twenty years who was, of course, completely incapacitated for clerical work.

CAUSE OF THIS CONDITION.

The case first mentioned had no stigmata of congenital lues, nor error of refraction so that a general toxæmia is the most probable cause. These cases have practically always a history of untreated yaws, and this may be one of the later lesions. In fact this condition frequently accompanies other tertiary lesions due to yaws. In the later stages there is a degeneration of all the coats of the eye—the sclerotic being thinned out and showing marked varicose veins.

Sub-acute exacerbations of the disease also occur.

TREATMENT.

Operative treatment in a large number of cases is not possible at present in a general hospital. Not many of the patients have time to attend for regular treatment with eserine. Coloured glasses or preferably Crooke's glass B may be prescribed and any error of refraction corrected, if possible in Crooke's glass A. Liquor Donovan has proved useful.

If this serious condition proves due to yaws it is obvious that early treatment of yaws may prevent it.

A CASE OF ONCHOCERCIASIS.

DR. N. A. DYCE-SHARP—*Medical Officer.*

The interest in this case lies not in its rarity, for the condition is probably common enough in endemic areas, but in the intelligent interest of the patient and the information he was able to afford in regard to subjective symptoms.

He was a Basel Mission catechist of about twenty-eight years of age. He first attended on the 29th July complaining of pain in the chest and fever which regularly recurred at intervals of a month. The pain definitely radiated from certain small tumours on the chest wall below the axilla on either side but these nodules were themselves painless. They had appeared six or seven years before and their formation had been attended with a good deal of local tenderness and fever. The tenderness had ceased after a month or six weeks, by which time the tumours had become more prominent. He could not say if they had grown at all since then.

The nature of the tumours was explained to him and their removal advised. He could not stop for treatment but he said he should return after his leave to have them cut out. On his return on the 20th September he reported having had a lot more fever and that since his last visit a fresh nodule had arisen about two inches above the first group on the right side and that this was exceedingly tender. It was found to be the size of a split pea and was very freely moveable.

The two larger tumours below it were removed that day under a local anaesthetic, chloroform having been refused. These two tumours contained the usual mass of adult worms in a yellow cream largely composed of mature embryos. Next day the small and acutely tender tumour was removed but no adult worms could be found in it. Hundreds of larvae of *O. volvulus* emerged from it on section of the tissue.

The following day the patient reported having had his first good night's sleep for six weeks, for during that period he said that the irritation of his skin all over his body had been so severe as to keep him awake at night. It was absent in the day. His temperature was still 99.6 but that may have been due to the operation and the septic state of the wounds, for it subsequently fell to normal and remained there.

A week later he asked to have several other tumours removed and pointed out one over the inner condyle of the femur (rt) which had only just arisen and was extremely sensitive on pressure. It proved only just palpable but he was most emphatic that it was the cause of the pain which radiated up his thigh to the hip.

Two more tumours were therefore removed both containing worms after which it was decided to try the effect of an injection of .3 gm of B. 1916, a gold preparation of Messrs. Bayer which had given good results in an earlier case. The effect of this drug was to cause an intense urticaria for several hours and to render the hitherto painless tumours (of which about five or six remained) not only tender but painful. But next morning all the pain and tenderness had disappeared and the tiny week old tumour near the knee was no longer painful on pressure.

A second injection was given a week later.

The patient put on weight almost at once and has been free from all symptoms ever since.



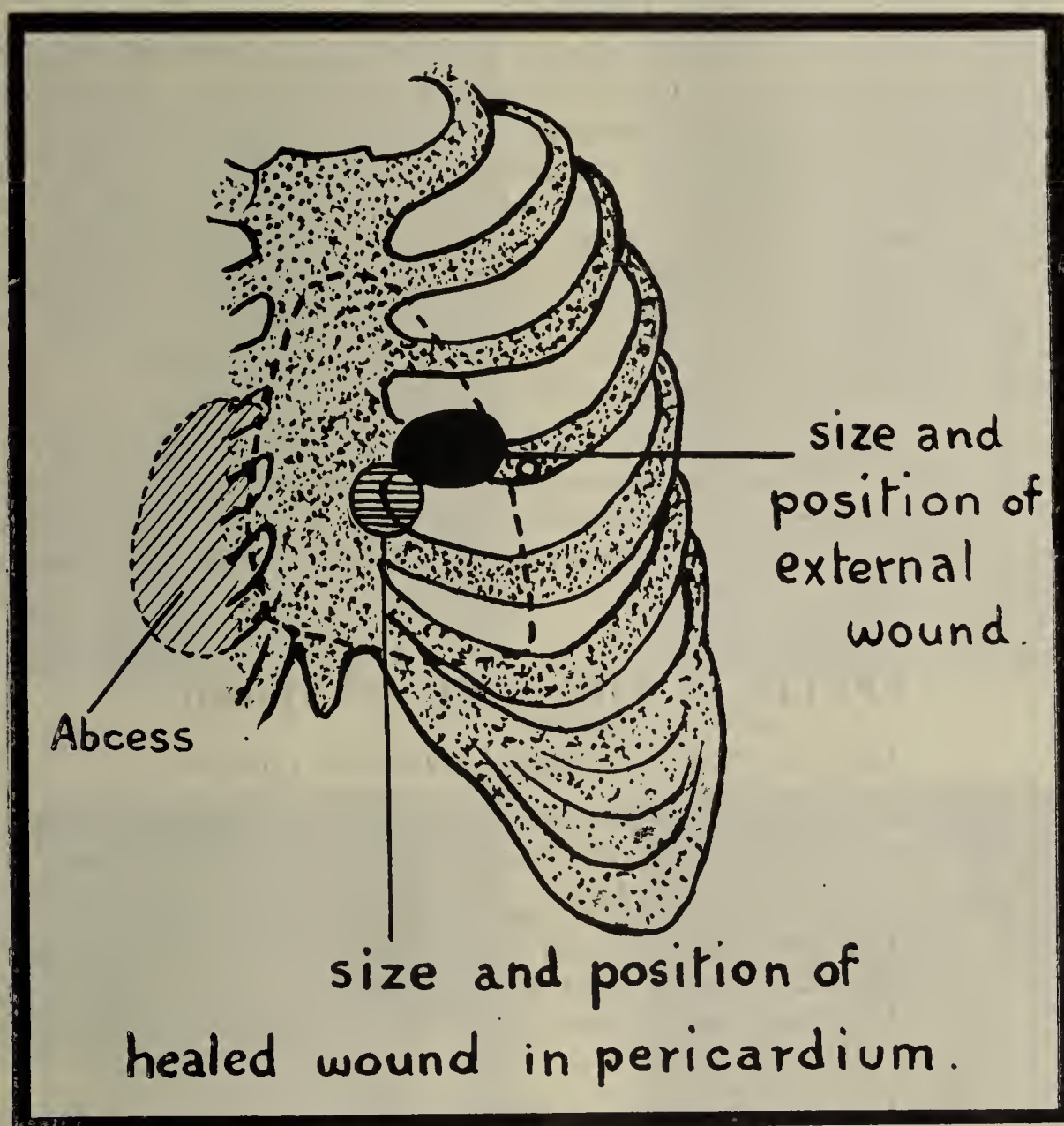
Gallstone, Tusks of Cow
Elephant. Fragment weighed 1 lb. 6 ozs.



Skull of Gorilla, Tusks and fragment of Gallstone of Cow Elephant.

THREE CASES OF INJURY BY ANIMALS.

By an Elephant.—In this case the victim was attacked while cutting a bunch of plantains by an infuriated cow-elephant. He was knocked down and gored first through the fleshy part of the thigh and then through the chest over the heart area (as shown in the diagram). He arrived in hospital at midnight, seven hours after the injury. He was cold and collapsed but soon revived after receiving two-thirds of a grain of morphia and an ounce of brandy. The wound in the leg was a perforation on the inner side (the whole length of the tusk must have passed through it) and a protrusion of torn muscle on the outer side, the whole being covered with mud and dirt. It appeared as though the heart must have been perforated if the blow was delivered from the left side, for the intercostal muscles were bulging through a wound $2\frac{1}{4}$ inches in diameter. But the heart appeared to be functioning normally. Delorme condemns any probing of a heart wound. Both wounds were therefore painted with iodine and fomented four hourly. On the fifth day the patient was feeling and eating well, thanks to morphia, rectal salines and frequent hot fomentations. On the sixth day he developed a rigor with intense pain in the chest. He died on the eighth day.



INJURY BY ELEPHANT.

During the ten minutes allowed for a post-mortem by the widow, the fifth rib was found fractured and reunited two inches from the sternum while one inch nearer the mid line there was a healed wound in the pericardium the size of a penny. The heart itself was apparently uninjured and the pericardial fluid, though somewhat in excess, was not purulent. There was, however, a large collection of pus in the anterior mediastinum and this was doubtless the cause of death.

A hunter was sent out to kill the elephant and later brought back the tusks and parts of two gall stones. One fragment weighed when fresh one pound, six ounces and the whole stone must have weighed $2\frac{1}{4}$ lb. It seems reasonable to attribute the unusual peevishness of this cow-elephant to the massive cholelithiasis from which she must have suffered.

The specimens have been sent to the Yaba Museum.

By a large ape ?Gorilla.—The ape that caused the injuries in this case was most probably a gorilla. The fresh skull of an ape similar to the animal that caused the injury was brought in. The creature seized his victim by the arm and leg and bit a large piece out of his thigh. The old man struggled and freed himself and the ape departed drumming on his chest. This case was treated in the village where it occurred. As the bleeding had stopped cyllin fomentations were applied but no attempt was made to sew up the wound which slowly granulated up. The man has since died but not before, according to report, the wound had healed completely.

This kind of injury, which is far from uncommon, appears from local accounts to be typical of wounds inflicted by gorillas which cause severe laceration and even loss of the soft parts but do not often cause compound fractures.

By a leopard.—The victim in this case was a boy of seventeen, on to whose shoulders a leopard dropped from a tree. He belonged to the same village as the first case and he was at once hammocked in to hospital. There were numerous injuries all over the trunk caused by the claws, while the left hand was badly bitten, with compound fractures of the fourth and fifth metacarpal bones. The most serious injuries were inflicted in the neck where the leopard had apparently fixed his teeth in the nape causing four punctured wounds down to the vertebrae. There were also deep lacerated wounds on the face caused by the claws.

After forty-eight hours there was a generalised oedema of the tissues of the neck which embarrassed the breathing but subsided with free drainage of the wounds, all of which suppurated with foetor. The boy left the hospital quite recovered after six weeks.

EPULIS IN THE AFRICAN NEGRO.

DR. CLIVE J. H. SHARP—*Medical Officer.*

The two cases of epulis here described and illustrated are worthy of notice, if from no other fact than that of their size.

Case 1.—A Hausa native, male, aged twenty years :

The patient had had the tumour for two years during which time it had been steadily increasing in size. The only subjective symptom complained of was difficulty in eating.

The photographs show the patient before and fourteen days after operation.

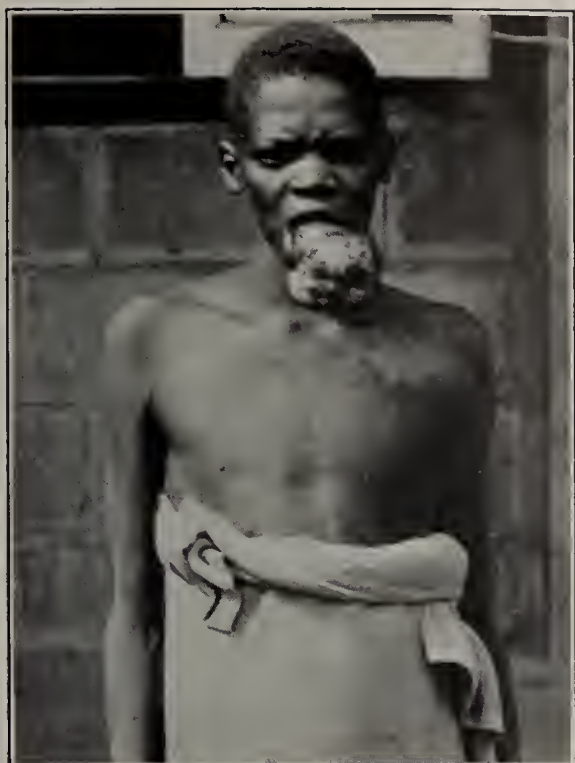
Case 2.—A Hausa native, female, aged thirty years :

In this case the condition was of three years standing. The difficulty in eating was more marked in this patient and had resulted in great emaciation.

The photographs show the patient before and three weeks after operation.

The microscopical examination showed that the growths were of the nature of fibromata.

No malignant changes were present in either tumour.



EPULIS—Before Operation.



EPULIS—Before Operation.



EPULIS—After Operation.

The anaesthetic employed in each case was rectal ether. The outstanding difficulty in both operations was the control of haemorrhage. This was carried out by the use of the cautery. In Case 2 there was the added danger of immediate suffocation from the tongue falling back. This was overcome by rapidly splitting the tumour in halves to reach the tongue, which was pulled forwards and a rubber tube was passed down to the region of the glottis. Neither of the cases have shown any sign of recurrence after six months.

ABSCESS OF SPERMATIC CORD SIMULATING STRANGULATED HERNIA.

DR. H. B. BOUCHER—*Medical Officer.*

Sex—Male.

Tribe—Efik.

Age—Forty.

Date of admission and operation—25th November, 1926.

History.—Had a swelling in the right groin for three or four years but it had given him no trouble till two months before admission when it began to be painful and to increase in size. One week before admission it became somewhat larger and very painful and tender. He sought admission on account of acute pain in the groin. He had previously suffered from gonorrhoea.

On admission.—A very tender and painful swelling was present in the right groin, apparently emerging from the inguinal canal and extending down to the scrotum. No cough impulse was felt. There had been no constipation or vomiting. Temperature 99.8. Pulse eighty-eight. A diagnosis of irreducible inguinal hernia becoming strangulated was made.

Operation.—An incision was made over the mass in the groin and on dividing the coverings of the cord, pus appeared from a perforation in a hard swelling beneath, which was of a purple colour and was at first thought to be strangulated bowel. On dividing the constricting band and defining the mass, this swelling was found to consist of an enormously thickened spermatic cord containing in its centre a thick-walled abscess, the walls of which were becoming gangrenous and had indeed perforated in one place from which the pus was escaping. The whole of the structures of the cord were contained in this one thickened mass and the testicle was much atrophied. About half an ounce of thick yellow pus was evacuated from the abscess. A small hernia was found adherent to the cord and the sac contained inflamed and adherent omentum. A radical cure of the hernia was performed and the abscess drained with a thick rubber tube, the remainder of the wound being closed.

The pus was not cultured but a smear showed staphylococci and Gram negative bacilli. No gonococci or other organisms were seen. The blood was found to have a slightly positive Sachs-Georgi reaction.

Subsequent history.—The patient made a good recovery, the cord decreasing very much in size and it is now (three weeks later) nearly normal and the wound healed.

No reference can be found to this type of case in the standard text books of surgery, which do not mention abscess of the spermatic cord, as this appeared to be.

In "Diseases of the Male Organs of Generation" by Kenneth M. Walker, it is stated that inflammation of the vas deferens is invariably secondary to infection elsewhere, either in the urethra or the epididymis. Chronic vasitis accompanies a chronic epididymitis. It is therefore considered that the abscess in this case was secondary to an old gonococcal epididymitis in view of the fact that the man admitted having had a gonococcal infection, and that the abscess had become chronic and was secondarily infected.

HYDROCELE OPERATIONS.

DR. L. WYNNE DAVIES—*Senior Medical Officer.*

I have performed radical operations in about seventy cases of the above condition during the last two years. The type of operation has varied according to the case as follows: (*a*) when the tunica vaginalis sac is easily separated from the surrounding tissues, I usually cut away the redundancy of the sac, and stitch the cut edges up to surround closely the testis and its cord. This is a very satisfactory operation in suitable cases but apt occasionally to leave haematomas if the tissues are thick and the cremaster hypertrophied; (*b*) Jaboulay's operation, *e.g.*, turning the sac inside out is easily performed, but is not so satisfactory as it leaves the testis and its appendages uncovered by endothelial tissue afterwards and a painful fibrosis of the skin often results; (*c*) in very large and thick walled sacs, I plicate the sac from within several rows—this gives good results; (*d*) in very old and feeble men often with very large hydroceles, I simply incise and leave in a long drainage tube after washing out with Tr. Iodine on two or three successive days.

ACTINOMYCOSIS.

A young Fulani Dogari aged twenty-five years admitted with a roughly ovoid swelling of the size of a large coconut in the left lower quadrant of the abdomen.

This was board-like in hardness with a shiny tender skin surface which simulated closely a rapidly growing sarcoma. History of some five months' duration, but latterly painful and obviously affecting iliopsoas region.

Temperature up to 102° F. in the evening. Under stovaine spinal anaesthesia an incision was made into the swelling which lay as I say in the sigmoid colon region. On cutting through an outer stratum nearly an inch thick of very dense vascularised fibrous tissue, I came on to an abscess cavity holding about six ounces of pus.

Posterior and external to this was the main board-like almost cartilaginous mass—it was obviously not sarcomatous from the character of the outer peel cut through.

The character of the pus pointed to actinomycosis, no large bowel could be made out through this extracolonic mass. He was given twice daily, baths, hot permanganate of potash and ten minim doses of Tr. iodine t,d,s in milk (colloidal iodine as recommended by a writer in the British Medical Journal). Within six weeks there was absolutely no sign of any swelling at all. I should say that a week following the operation a faecal fistula developed, but faeces ceased passing after the second day.

DANGER OF STOVAINE.

Stovaine (spinal anaesthesia) has been used by me in about 400 cases during the last two years. Abdominal operations including hysterectomies, cystotomies, all hernias and hydroceles, elephantiasis and all operations on the lower limbs have been done under its influence.

Out of the number I have had three cases which showed an alarming fall of blood pressure—two being cystotomies (one for stone and one for retention with tight stricture) in rather old patients over fifty years of age, the other being in a weedy youth with hernia; all responded to pituitrin, strychnine, digitalin, hot cloths to praecordia and other remedies. The symptoms commence with yawning, then restlessness, vomiting, a cold clammy skin and pulselessness.

I now make a point of letting patients have a good meal an hour or two before coming to operation table, also giving preliminary pituitrin and strychnine to those who are old, feeble and especially when the operation is likely to be prolonged and severe. Intra-spinal pressure of cerebro-spinal fluid is very low normally in the average native and it is not often one gets a good high pressure flow of the fluid after puncture. Rather it comes in single drops after much delay. I now give copious water drinks the day before operation and on the morning of operation. It certainly helps matters.

PERITHELIOMA OF THE CAROTID GLAND.

DR. QUINTIN STEWART—*Medical Officer.*

Aminetu, a female Hausa, twenty-nine years of age was admitted to the African Hospital, Kaduna, on 6th December, 1925, complaining of a swelling in the neck.

This had lasted for three months, and was causing pain and slowly increasing in size; cough with much sputum had annoyed her during this period.

On examination a tumour was found to be present on the right side of the neck, just behind and below the angle of the jaw; it felt rather larger than a golf ball, was somewhat irregular in shape and hard in consistence; it was slightly movable horizontally but not vertically. The diagnosis made was "tubercular adenitis."

Sputum—Excessive and watery—no tubercle bacilli.

Urine—Nil.

Faeces—Cysts of *Entamoeba histolytica*.

Ova of *Schistosoma mansoni*.

Ova of *Ankylostoma duodenale*.

Blood Smear—Nil.

Sachs Georgi—Weakly.

Under the impression that the operation would be a simple one the tumour was cut down on without any special preparation—the anaesthetic chloroform being given by a dispenser. During the dissection the internal jugular vein was found to run over the surface of the tumour and required ligature, the carotid artery was then seen to enter the proximal part of the tumour. At this stage the anaesthetist was having great difficulty, and it was obvious that in the circumstances the operation would have to be abandoned.

A fortnight later (rectal ether being contraindicated by the state of the rectum) Dr. Robertson gave chloroform followed by ether successfully under difficult conditions of excessive secretion and obstructed air way. The lower border of the tumour was defined and the carotid artery ligatured and divided. The tumour was separated from below upwards.

The vagus nerve was markedly adherent to the under surface and required to be dissected off. The external and internal carotid arteries were ligatured and divided as they emerged, much reduced in size, from the distal portion of the tumour. The superior laryngeal and hypoglossal nerves had to be divided as it was not possible to separate them from the substance of the tumour.

Naked eye appearance after removal—the tumour was irregularly cone shaped with the apex above—it was encapsulated and appeared to have been removed entire. The common carotid artery entered at the base and ran through the substance of the

tumour in the midst of which it divided into its external and internal branches which were seen to emerge distally. On section the growth was found to be hard; the cut surface was white in colour and homogeneous in nature; the carotid artery was situated near the centre and the tumour seemed to grow from its walls. Sections were kindly cut and reported on as follows by Dr. Dawson, Histologist to the Royal College of Physicians, Edinburgh:—

“ The structure is in general that of an alveolar tumour with polyhedral cells in compact groups without a lumen, and surrounded by a very cellular and hyperplastic stroma. The capillaries in the stroma have very cellular walls. It is probable that the tumour cells are specific cells of the carotid body and the tumour growth involves also the endothelium.

The tumour must be regarded as a ‘ perithelioma ’ of the carotid gland.”

Post operative progress:—

“ Deviation of anterior portion of tongue to right side on protrusion (hypoglossal nerve lesion).

No symptom of brain involvement from tying of carotid, this was to be expected as the growth had gradually reduced the blood supply.

The patient was discharged with the wound healed—she was apparently quite well.”

CHRONIC IRREDUCIBLE INTUSSUSCEPTION.

Osuman, aged twenty-eight, a trader of Gesu was admitted to the African Hospital, Kaduna, on 4th January, 1926, complaining of “ pain and noises in the belly,” this had lasted for twenty-five days and the pain had apparently been of a colicky nature.

On examination the tongue was furred, and on inspecting the abdomen slight distension and marked peristalsis were evident; a distinct ladder pattern could be made out.

Stenosis noises were constantly heard, and a griping pain came on from time to time. The spleen was enlarged. Although these signs and symptoms were constantly present there was no definite obstruction, as faeces and flatus were being passed. Palpation did not reveal a tumour and rectal examination was negative. There was nothing in the faeces to suggest a cause. Abdominal exploration being indicated, the abdomen was opened under spinal anaesthesia and an intussusception twelve inches in length discovered low down in the small intestine; it was irreducible owing to strong adhesions at the proximal end between the entering and returning loops. Resection was performed followed by a lateral anastomosis—three and a half feet of gut were removed. The gut above the intussusception was greatly hypertrophied showing that the condition was of some standing. Naked eye appearance on opening intussusception—the gut at the apex was very congested and four inches distal to the apex a large scar of a healed ulcer was present in the wall, this was evidently the original cause of the intussusception, the deformity in the wall and the loss of muscular tissue probably upsetting the normal peristaltic wave at this point and so forcing this portion of the bowel distally into the adjoining tube.

The after course was uneventful—the patient was well on discharge.

PERFORATED EMPYEMA OF GALL BLADDER.

Thomas Quaye of Accra, Carpenter, fifty-seven years of age, was admitted on 30th April, 1926, to the African Hospital, Kaduna, complaining of acute abdominal pain for three days and vomiting for one day. He had lost weight recently and abdominal symptoms had been present intermittently over a long period.

On examination the tongue was dry and furred. An umbilical hernia was present but had no contents at the time. Pain was complained of in the region above the umbilicus and tenderness with a certain amount of rigidity was present there, this rigidity was most marked over the gall bladder area. During the period of observation the temperature was of the septic type swinging from below normal to 101° F. and the pulse rate averaged eighty-five going as high as 100 on occasions.

Operation being indicated, the abdomen was opened in the mid-line with a view to repairing the hiatus in the wall before closing. A localised abscess was found shut in by adhesions and communicating with the gall bladder in which there was a large perforation where the wall had sloughed following an empyema. One stone was removed from the much thickened gall bladder, it gave the impression of being mainly composed of cholesterin, it was impacted in the opening of the cystic duct.

A considerable portion of its wall having sloughed the gall bladder was removed. Drainage to stump *via* stab wound and to denuded liver area *via* original wound, was arranged. The recti muscles were defined and the hernia repaired by bringing the different layers together.

Post-operation Course.—Bile drained freely from stab wound for ten days then the tube was removed—the wound closed in twenty days.

Progress was uneventful. The patient seen after discharge on 11th August, 1926, was well.

APPENDIX A.

ANNUAL REPORT OF THE MEDICAL RESEARCH
INSTITUTE, 1926.

BY

ANDREW CONNAL, M.D., D.P.H., D.T.M. AND H.

MEDICAL RESEARCH INSTITUTE,

YABA,

(NEAR LAGOS, WEST AFRICA),

21st March, 1927.

SIR,

I have the honour to present the Annual Report of the Medical Research Institute for 1926.

2. The following subjects received particular attention:—
Rat plague, yellow fever, prickly heat, tropical ulcer and markings on *Aedes argenteus*.

3. Plague in rats was found to be still in an acute form, no evidence of chronicity having been obtained.

There were further indications that yellow fever in West Africa is not identical with that disease in the Western Hemisphere.

The cause of prickly heat is considered to be a fungus belonging to the genus *Monilia*.

The main factor in the production of tropical ulcer is thought to be *Bacillus pyocyaneus*, of which organism a number of strains have been isolated.

The markings of *Aedes argenteus* have been proved to be very variable and no reasons for the creation of new varieties have arisen.

4. Other subjects dealt with are blackwater fever, malignant disease, black tongue, leprosy and mosquito-dissections.

5. Those who suffered from blackwater fever have invariably shown a malarial history.

Malignant disease has been shown to be by no means uncommon and the various forms of cancer to be not rare.

“Black tongue” was investigated and found to be due to a fungus of the oidium type, occurring in cases of relapsing fever.

Moogrol, in the treatment of both early and late cases of the three forms of leprosy, continued to be of great use.

Mosquito dissections showed that several local species were vectors of parasitic disease.

6. The Director was on leave from 12th February until 19th August as was also the Honorary Entomologist.

7. The Bacteriologist, Dr. E. C. Smith was on duty throughout the year, along with Mr. E. F. Hines, Laboratory Attendant.

8. Mr. F. W. Randall, appointed Laboratory Attendant, assumed duty on 4th February.

9. Mr. Hines did useful work in rat dissections, water analyses and media-making.

10. Mr. Randall was very helpful in section-preparation, in micro-photography and in the making of charts.

11. Dr. J. C. Paisley, on appointment to the West African Medical Service was seconded for rat plague work at Ereko, on his arrival in Lagos on 16th September. His assistance was of very great value.

I have the honour to be,

Sir,

Your obedient Servant,

A. CONNAL,

*Director of Medical Research
Institute.*

THE HONOURABLE

DIRECTOR OF MEDICAL AND SANITARY SERVICE,
LAGOS.

RAT PLAGUE IN LAGOS.

The dissection of the rodents caught by the official trappers or brought by volunteers was continued daily throughout the year.

Trapping was steadily pursued in the municipal area, but as concentrated efforts took place from time to time, in certain districts, and as the source of the rats brought by volunteers could not be determined, it would be misleading to group the findings, as has been done in previous reports, under the headings of Lagos, Iddo, Ebute Metta and Apapa. Consequently the results of the year's work are given under one heading, that of Lagos Municipal Area.

The original and unvaried scheme has been adhered to, that is, to dissect all rodents (with the exception of mice) after they have been identified and numbered, so that their species is known and their place of capture is traceable (except in the case of specimens from volunteers, who are purposely not asked for information). Smears were made from the spleen of each dissected animal, were fixed by heat and were stained with carbol thionin blue, after which each and all were examined microscopically, as has been the unbroken practice since the beginning of the outbreak of plague in Lagos, two and a half years ago.

The number of rodents and shrews thus examined in 1926 is 45,749, made up of 38,827 black rats, 4,003 brown rats and 2,919 shrews. One specimen of the "pouched" rat (*Cricetomys gambianus*), a "tree-bear" (*Hyrax* sp.) and two domestic cats were also dissected. During the latter part of the year it was decided to re-commence the examination of mice, with a view to checking the results obtained in the previous year when it appeared that plague in these animals was of infrequent occurrence.

The examination of the mice, which numbered 15,989, from the latter part of October until the end of December, showed that only four individuals suffered from plague, a negligible total at a time when from 1.70 to 6.16 *per cent.* of rats were infected.

The result of the mouse examination, therefore, is considered to have justified the course adopted, that of concentrating all investigation on the rats, thus saving much time and labour besides slides and stains. Including the mice, the full total of animals examined for plague is sixty-one thousand, seven hundred and thirty-two.

The monthly numbers and the percentage of infected animals are given in Tables I and II.

TABLE I.

	Black rat.	Positive.	Brown rat.	Positive.	Total rats.	Positive.
January ...	3,099	72=2·32 %	317	4=1·26 %	3,416	76=2·22 %
February ...	2,516	55=2·18	302	4=1·32	2,818	59=2·09
March ...	2,908	44=1·51	257	2=0·77	3,165	46=1·45
April ...	2,800	15=0·53	233	nil.	3,033	15=0·49
May ...	3,525	19=0·53	270	nil.	3,795	19=0·50
June ...	3,422	52=1·51	247	4=1·61	3,669	56=1·52
July ...	3,897	65=1·66	386	3=0·77	4,383	68=1·55
August ...	3,627	71=1·95	450	9=2	4,077	80=1·96
September...	4,313	202=4·68	618	12=1·94	4,931	214=4·33
October ...	3,022	214=7·08	365	21=5·75	3,387	235=6·93
November	2,870	78=2·71	298	8=2·68	3,168	86=2·71
December ...	2,828	51=1·80	260	15=5·76	3,088	66=2·13
Totals ...	38,827	938=2·41	4,003	82=2·04	42,830	1,020=2·38

TABLE II.

	Shrews.	Positive.
January ...	133	nil. %
February ...	138	nil.
March ...	202	nil.
April ...	192	nil.
May...	192	nil.
June ...	189	nil.
July...	168	nil.
August ...	251	1=0·39
September ...	441	1=0·22
October ...	333	nil.
November ...	342	nil.
December ...	338	nil.
Totals ...	2,919	2=0·06

It will be seen from Table I that in 42,830 rats there were 1,020 infected with plague as compared with 15,989 mice of which four were infected. The period during which the mice were examined was 25th October, 1926, and 31st December, 1926, and in the same period 6,860 rats were dissected, of which number a total of 198 were shown to be plague-infected. It must not be thought that no mice were caught between January and October, for the daily bag of these was between two and three times larger than that of the rats.

The shrews (*Crocidura manni*) seldom exceeded twenty per day so that it was an easy matter to dissect them all. Table II gives the figures concerning them.

Chart I gives the percentage of infected rats and the total number of recorded cases of human plague for each week of the year. It shows the close relationship which thorough investigation alone can bring about. In other words, the chart proves that the system adopted for the detection of both human and rodent cases was efficient.

A minute examination of the rats was begun on 29th September, on a definite basis, after a month's survey of the usual conditions found on dissection, at this particular period, and compared with two years' previous experience. The dissection of one hundred rats per day was aimed at, although when time and material permitted, this figure was often exceeded. The total in ninety-four days was 9,178 a satisfactory figure considering that the number of rats brought in on Sundays seldom reached sixty.

Each rodent was fixed on a dissecting board by means of a fastener through each of the four limbs. After incision from chin to pubis, the skin was deflected to expose the cervical, axillary and groin groups of lymphatic glands. The abdomen and thorax were then opened and the state of the cavities and viscera noted.

Smears were taken from any and all enlarged, inflamed or suppurating lymphatic glands and cultures were made in all doubtful cases. Haemorrhages and pleural or peritoneal effusion were looked for. The condition of the liver and the spleen was observed and smears were taken from both organs. Smears were also taken from the lungs, the heart blood, the kidney, the suprarenal and the intestines when thought advisable.

As a result of this method of examination, it is possible to give certain facts and figures regarding rat plague in Lagos.

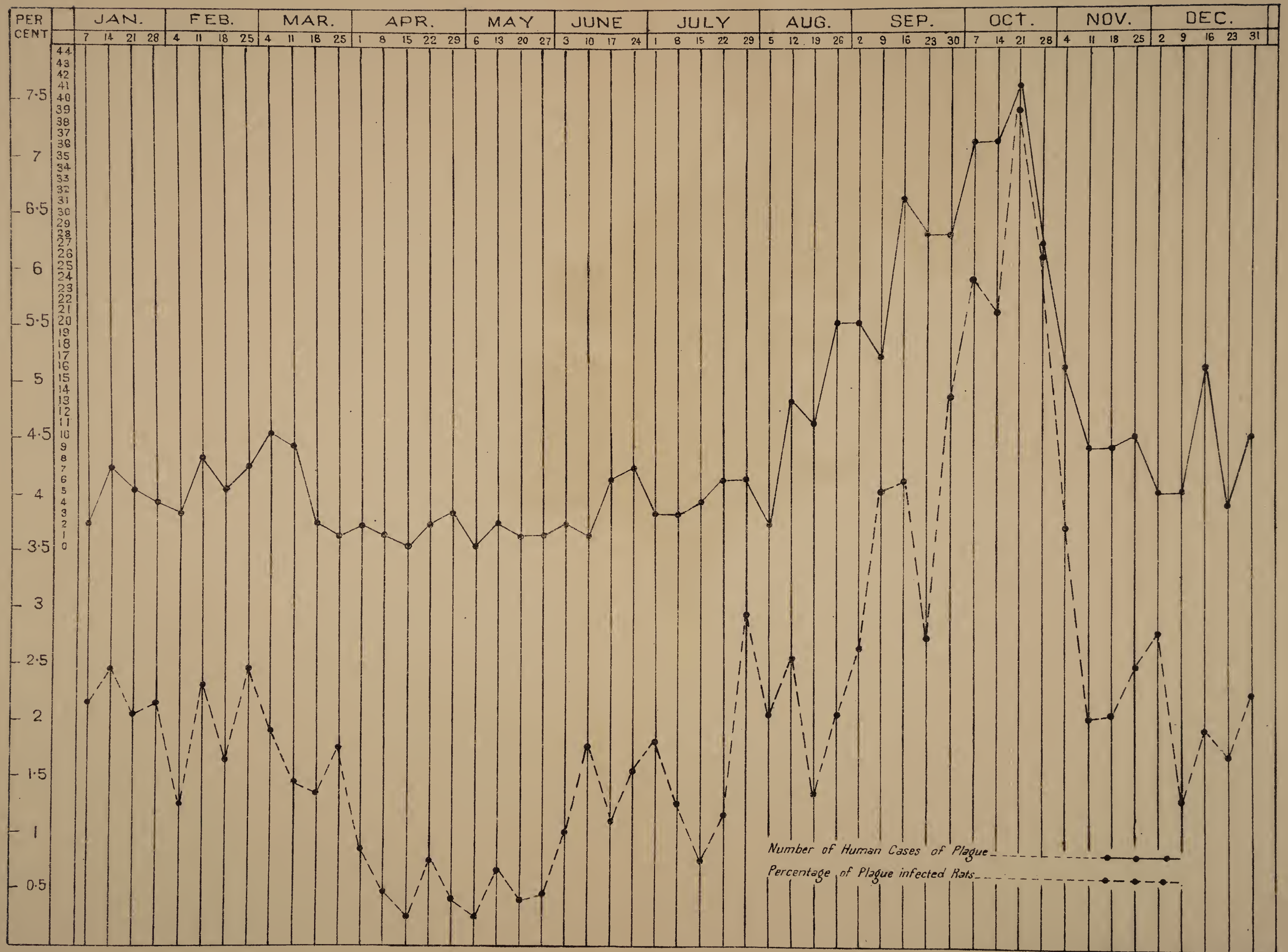
Dr. J. C. Paisley, who has done the bulk of the dissections, has drawn a very complete picture of the usual findings in *infected rats*, which is as follows:—

Rigor mortis.—This is generally well-marked in a fresh plague-rat, but it is also of common occurrence in apparently healthy rats.

Subcutaneous congestion.—It is an almost constant feature. It may be either local or general. Local congestion is always observed around the situation of the primary bubo, and it is common in all the glandular areas, *i.e.*, cervical, axillary and groin, even although no bubo is present. It is commonest in the neck, corresponding to the greater frequency of buboes in that region than elsewhere. General subcutaneous congestion is seen immediately on cutting the skin, as a rule, but if slight it may not be noticed until the skin is completely reflected off the thorax and abdomen. It has been observed in other conditions such as pregnancy, but its presence should arouse suspicion at the outset of the examination.

Subcutaneous haemorrhage.—This has not been found to be common. Haemorrhages have been frequently observed in the cervical region, but as the rats have been caught in break-back traps,

CHART I.



a traumatic cause is the more likely. Small points of haemorrhage may occur, though rarely, in the neighbourhood of the primary bubo. Haemorrhages in the flank have been observed in only two or three of the plague rats dissected.

Subcutaneous oedema either local or general, has not been encountered.

Enlarged lymphatic glands fall into two groups, namely primary buboes and secondary inflammations. The primary bubo, in its early stages is deeply congested and its colour is a dark reddish purple. There is considerable periadenitis, so that the gland is adherent to the surrounding tissue. When the bubo is cut across, haemorrhagic points are seen and the centre of the gland is softer than normal. At this stage the enlargement may be only slight. In the second stage, however, the increase in size is marked and the colour is yellowish white. The local congestion persists but is not so intense and the bubo is firmly fixed in the surrounding tissue. When cut across, the centre of the bubo is found to be semi-liquid and of a greyish or yellowish colour. The bubo is easily recognised at this stage, its size, colour and semi-liquid centre being distinctive. At both stages the bubo feels much harder to the forceps than an ordinary gland and it can often be detected by probing in the gland areas with this instrument.

Secondarily infected glands, that is, glands infected from the blood stream in septicaemic plague, are deeply congested, slightly enlarged and retain their normal consistence. They are not adherent to the adjacent tissues and local subcutaneous congestion is not so marked as in the case of a primary bubo. Microscopically they contain relatively few bacilli and these are typically bi-polar in their staining reaction, whereas the primary bubo is generally packed with bacilli which, especially in the second stage, include numerous involution forms. Buboes are most common in the cervical region and they are about equally as frequent in the axilla as in the groin. Buboes have not been found in the mediastinal or retro-peritoneal chain of glands.

Two or even more buboes may co-exist, such as one on each side of the neck, or one in the cervical and one in the axillary region.

The liver may show one of two characteristic changes. The commoner is manifested as a fine mottling. The other is speckled either finely or coarsely. Neither of these two conditions is, however, of frequent occurrence although when present they are practically pathognomonic. In many cases the organ shows only congestion and a considerable number exhibit no noteworthy change macroscopically.

In the case of "fine mottling," small stellate patches of congestion are scattered over the surface, alternating with greyish white areas, and with no distinct line of demarcation between them.

The "speckled" liver shows numerous well-defined greyish-white rounded patches of necrosis which vary in size. When fine, they are very numerous so that the organ has the appearance of having been dusted with pepper. They are, however, sometimes confined to the edges of the liver in which situation they are liable to be missed. In the coarser form of speckling, the necrotic spots are about the size of a pin head, in which case they are not so numerous as in the fine type.

The spleen is usually congested, swollen and protrudes further over the stomach than normally. But in adult rats, more particularly in the brown rat, the organ is frequently enlarged and congested, due to causes other than plague. In rare cases the spleen shows a speckled condition similar to that seen in the liver.

The kidneys and the suprarenals share in the general congestion but show nothing characteristic. For the purposes of naked eye diagnosis they are negligible.

The stomach.—Nothing abnormal has been noted in this organ.

The intestines.—In a certain proportion, not a large one, the intestines show extensive haemorrhage. The small intestine is the usual site, but in a few cases the large intestine is similarly affected. Further information on this interesting finding is given on a later page under its appropriate heading.

Peritoneal effusion.—An excess of blood-stained fluid in the peritoneal cavity has been frequently noted, but in every case trauma could not be excluded as a cause. An excess of clear peritoneal fluid has not been observed.

The lungs in plague rats are sometimes congested but broncho-pneumonic patches and pneumonic areas have not been recorded.

Pleural effusion is a very characteristic feature. The fluid is typically clear and straw-coloured and is usually abundant. Rarely, it is small in amount and very rarely blood-stained. An abundant clear pleural effusion has not been found in any non-plague rat.

Given a fresh plague rat (exceptionally they were brought fresh in Lagos) the characteristic signs are, marked rigor mortis, general subcutaneous congestion, an inflammatory condition in the cervical, axillary and groin areas, pleural effusion, enlarged spleen and a mottled or speckled liver. An analysis of the individual findings brings several interesting features to light.

The total of rats, black and brown, minutely examined is 9,178 of which there were 339 plague-infected.

Buboes, inflamed glands or gland abscesses were noted in 714 individuals. Plague bacilli were demonstrated in smears or by culture or by both means in 106, a proportion of roughly one in seven.

Positive cervical glands out-numbered all the others. The actual figures are:—

Cervical only	...	...	...	...	64
Axillary only	...	...	...	...	7
Groin only	...	...	...	...	7
All three sets	...	...	...	...	11
Cervical and axillary	...	...	...	...	9
Cervical and groin	...	...	...	...	7
Axillary and groin	...	...	...	...	1

The cervical glands, therefore, were affected in ninety-one cases, the axillary in twenty-eight and the groin glands in twenty-six.

There were bi-lateral cervical buboes in eleven cases and bi-lateral groin buboes in one.

In the total of 714 rats with enlarged glands, the gland contents were purulent in forty, *i.e.*, abscess-formation had occurred. The distribution was cervical twenty-nine, axillary six and groin five.

Of the twenty-nine cervical abscesses, eight were definitely due to plague. *Bacillus pestis* was present in the liver and spleen as well as in the pus in six, and was found only in the abscess in two.

As regards the six axillary abscesses, the plague bacillus was isolated in two, being noted in the liver and spleen as well as in the abscess in one, but only in the abscess in the other.

The five groin abscesses included two which were due to plague, the organism being shown in the liver and spleen as well as in the gland contents in both.

It will be noted that, in the total of forty gland abscesses there were twenty-eight (twenty-one cervical, four axillary and three groin) in which the purulent condition was due to some cause other than plague, inasmuch as neither smears nor cultures revealed the presence of *B. pestis*.

Of the remaining twelve abscesses, nine (six cervical, one axillary and two groin) showed the plague bacillus in the organs as well as in the pus, so that the condition in each case was one of septicaemic plague.

There were, therefore, only three cases (two cervical and one axillary) in which the organism was apparently confined to the abscess. It is not possible to state whether or not these were instances of chronic or "resolving" plague. The three individuals were brought by volunteers to the collecting station, whence the great majority of infected rats come. The explanation of the much greater number of plague infections in the rodents from the collecting stations than in those caught by the official trappers is thought to be due to the fact that the rats, being sick or dying, are readily caught and brought in for the monetary reward offered. It is possible, therefore, that the three rats under discussion were definitely sick and that had they lived a septicaemia would have supervened. In any case, up to the time of their death, the infection being confined to the gland was non-transmissible by means of fleas. Instances such as these appear to be negligible from the point of view of the spread of plague at a time when the septicaemic is the prevalent form of the disease in the rodents. Had they been found during a quiescent period their potential danger would have to be considered. Meanwhile the abundance of food available to rodents from the numerous street hawkers and booths renders it unlikely that surviving rodents are eating their own plague dead. It may be added that inflamed retro-peritoneal glands, indicative of an alimentary mode of infection, have not been encountered in any rat yet examined.

In addition to the positive findings in the glands recorded above (twelve cases in which abscess-formation had occurred) there remains another series of ninety-four cases in which plague bacilli were demonstrated in the glands. These cases were either early stages of the primary bubo or were secondarily infected from the blood stream. In seventy-nine instances the organism was present also in the spleen and liver. There were, therefore, fifteen cases, all primary buboes, in which the organism was present only in the gland. Here again it is not possible to state whether or not these last were cases of chronic or "resolving" plague, but for the reason that the bubo in each case was firm and surrounded by an area of congestion, it is probably correct to assume that the rat was killed at an early stage of an acute infection.

In the total of 339 plague infections, smears from the liver and spleen were positive in 321, while as already noted, the glands were positive in 106 cases. In thirty instances the liver and spleen were positive although the enlarged glands were negative. In eighteen cases, as recorded above, the glands were positive when no *B. pestis* could be found in the liver or spleen. In 201 cases there were no definitely enlarged glands, only the smears from the liver and spleen being positive. In a large number of this last group, however, the animal was more or less putrid. In two positive cases, decomposition was so far advanced that only a portion of the liver was available for examination.

The following are the actual figures:—

Glands, enlarged	714 cases.
Glands, positive	106 „
Glands, positive, organs negative ...	18 „
Glands, negative, organs positive ...	30 „
Organs, positive, glands not enlarged	201 „
Liver smears only	2 „

The liver.—Particular attention was devoted to the naked eye appearance of this organ, from 14th November onwards. During that period, 110 plague rats were dealt with. The laboratory notes made at the time of dissection and analysed later, afford the following information:—

Mottled liver	30 cases.
Yellow liver	14 „
Speckled liver	12 „
Normal appearance	6 „
Congested appearance	4 „
Not noteworthy	26 „
Putrid rats	18 „
Total	110 „

These figures show that in over fifty *per cent.* of the cases the appearances in the liver, typical of plague in rats, were lacking. It is striking that the “not noteworthy” livers rank next numerically to the mottled livers, the latter being generally a sure indication of the presence of plague.

Pleural effusion.—In the same total, namely 110 positives, pleural effusion was observed in thirty-five, was not observed in fifty-seven and was impossible to look for, because of advanced decomposition, in eighteen cases.

Dr. Paisley's general description of the post-mortem appearances in rat plague, and also the short analysis of the cases that follows, have been based on “The Diagnosis of Natural Rat Plague” (Reports on Plague Investigations in India, No. XI). The Journal of Hygiene, Vol. 7, No. 3, July 1907, pp. 324-358. The outstanding differences between the Indian findings in 1907 and the Lagos results in 1926 (dealing with the comparatively small number of 339 plague rats), are that buboes (and positive findings in their contents) are less common, that positive results from the spleen smears are more frequent, and that macroscopic changes in the liver are less noticeable in Lagos than they were in Bombay. Pleural effusion is practically equally important as an indication of infection. It would appear that the prevalent form of rat plague in Lagos is the septicaemic. Apparently either from the virulence of the organism or the virginity of the soil, the bacillus is able to penetrate the gland barriers without greatly disturbing these and so gains access to the blood-stream, in the majority of the cases. Again, there is no mention of extensive intestinal haemorrhage in the Bombay analysis. It should also be recorded that very few infections have been found in rats whose length, excluding the tail, is less than five inches. This is probably merely a question of harbourage for fleas.

Chronic plague.—This has already been discussed in connection with gland abscesses, and the conclusion arrived at is that there is no direct evidence that such a condition exists or has existed amongst the rats in Lagos. In the same number of the Journal of Hygiene, quoted above, Report No. XIX, “On the natural occurrence of chronic plague in rats,” pp. 457-471, the signs of chronic plague are divided into: A, the visceral type (1) splenic nodules and abscesses, (2) mesenteric abscesses, and B, the peripheral type (*i.e.*,

abscesses in the submaxillary, axillary, pelvic and inguinal regions). It should be noted that in the present report, the term "cervical" is used instead of "submaxillary" and "groin" is employed in place of "inguinal."

No cases of the visceral type have been observed in Lagos, nor have abscesses been encountered in the pelvic glands.

Between 5th September and 31st December, 1926, a number of wild rodents were kept in captivity for varying periods in order to see whether any which died or were killed had plague. Seventy-three black rats, eight brown rats and seven shrews were obtained alive. The first animal obtained, a black rat, died after eight days captivity, of septicaemic plague. In no other case were any signs of plague found. The periods were:—

Fifteen days, one rattus.
 Fourteen days, two rattus.
 Thirteen days, one rattus.
 Twelve days, one rattus.
 Eleven days, three rattus.
 Ten days, one rattus.
 Nine days, one rattus.
 Eight days, one rattus, three norvegicus.
 Seven days, four rattus, one norvegicus.
 Six days, two rattus, one norvegicus.
 Five days, one rattus.
 Four days, three rattus.
 Three days, fourteen rattus, one norvegicus.
 Two days, two rattus, one norvegicus, four shrews.
 One day, thirty-six rattus, one norvegicus, three shrews.

As regards the question of "resolved" plague, the following conditions were found in the spleen:—linear bands twenty-five, adhesions eighteen, necrotic areas ten and perisplenitis eight. In no instance were plague bacilli recovered from the lesions either in smears or by culture, but the safest test, that of guinea-pig inoculation, was not employed, for the reason that, in most cases, the signs were those of healing.

INTESTINAL HAEMORRHAGE IN PLAGUE RATS.

So far as can be ascertained, intestinal haemorrhage has not been recorded as occurring in plague rats. Small haemorrhagic spots or petechiae have been known to occur under the peritoneal coat or under or into the submucosa but the present remarks deal with massive bleeding into the lumen of the intestine.

The systematic routine examination of the rodents of Lagos, which was begun on 29th September, 1926, led to the finding of twenty-six cases of this condition, between that date and the end of the year. In every case in which it was noted, septicaemic plague was present. The macroscopic appearances are striking and are not readily overlooked. The entire or the greater length of the alimentary canal, with the exception of the stomach is distended and thin-walled so that the dark or bright red contents are distinctly seen. On opening the intestine, the contained matter is found to consist of blood-stained mucus mixed with a small amount of faecal matter and a number of worms. Ordinary heat-fixed smears of the contents generally showed a number of bi-polar stained bacilli and duplicate smears stained by Gram's method showed these bacilli to be Gram-negative. In most cases there was considerable admixture with other organisms such as make up the usual intestinal flora, but in a certain number *B. pestis* greatly predominated and in a few the smear showed what seemed to be practically a pure culture. Fresh smears and wet-mixed smears stained by Heidenhain's iron haema-

toxylin method showed no pathogenic protozoa. Cellular elements, *i.e.*, red corpuscles, pus cells and epithelial cells were comparatively few, so that the condition is not an ulcerative one. In no instance was the cause found to be traumatic, there being no free blood in the peritoneal cavity and no sign of injury to any of the abdominal organs. The possibility of an original alimentary source of the plague infection, of which the intestinal haemorrhage might have been the direct result was also considered, but the absence of retro-peritoneal buboes or inflamed mesenteric glands appeared to negative this supposition. It was therefore concluded that intestinal haemorrhage as met with in the rats suffering from septicaemic plague, is a late manifestation of that disease.

The occurrence of intestinal haemorrhage in twenty-six out of 339 plague rats, a percentage of 7.66, led to a consideration of its possible influence in the spread of human plague. In some epidemics, the cases are bubonic and septicaemic. In others, pneumonic cases occur as well, and in others again the cases are all pneumonic. The present considerations concern the second group, in which the pneumonic infection has been held to be due to a septicaemia following upon the bubonic form and its occurrence as a pure pneumonic form in other cases in the same epidemic, as due to direct contact by inhalation. It is presumed that the sick rat with intestinal haemorrhage, in Lagos, may deposit its blood-stained faeces on the earth floor of a native house, during the night. The usual sweeping which takes place on the following morning will distribute numerous plague bacilli in the air. The native habit of bending down whilst sweeping, using a short stiff home-made switch, renders the inhalation of some of the plague germs almost certain. It seemed that here was a probable explanation of some of the occasional cases of pneumonic plague which occur in the course of an epidemic in which most of the cases are of the bubonic type. With a view to ascertaining the infectivity of the blood-stained faeces of plague rats, the following experiments were undertaken:—

Experiment (1). 9.11.26—Intestinal contents of Rat No. 108,174 rubbed into scarified area, abdomen of each of two guinea-pigs. The infective material had been kept three days in the dark at room temperature, before use. Result. The animals each developed a small shotty gland in the inguinal region. Otherwise there was no sign of infection and both animals remained healthy. This result was considered to be negative.

Experiment (2). 10.11.26—Similar to Experiment (1), using material from Rat No. 108,508, but in this case the intestinal contents had been kept for only one day before use. Result as in Experiment (1).

Experiment (3). 18.11.26—Material from Rat No. 108,710, mixed with sterile dust on day of capture, 11/11/26, kept in dark at room temperature for one week. Mixture then suspended in sterile saline and injected into the trachea (after cutting down and exposing it) of Monkey No. 1. (*Cerco-pithecus tantalus*). The material was also rubbed on two guinea-pigs as in Experiments (1) and (2). Results. Negative.

Experiment (4). 19.11.26—Faeces of Rat No. 109,797, mixed with sterile dust at once, allowed to dry for two hours in the dark, at room temperature, then suspended in sterile distilled water and injected (as in Experiment (3)) into exposed trachea of Monkey No. 2. (*C. tantalus*). One guinea-pig also inoculated, as before. Two c.c. of the suspension were used for the monkey.

The monkey died in seventy-two hours. P.M. 22.11.26—General subcutaneous congestion on section. Cervical, axillary and groin glands swollen and congested. Left lung showed a fibrinous pleural exudate and both lobes showed extensive areas of red hepatisation. Right lung, middle lobe also showed red hepatisation. Both liver and spleen enlarged, congested and firm. Smears from the glands, the lungs, the liver and the spleen showed *B. pestis*, these being particularly numerous in the lung smears. The guinea-pig behaved as in Experiment (1).

Experiment (5). 24.11.26—Bloody faeces of Rat No. 110,279, kept in dark at room temperature, twenty-four hours, smeared on scarified area, abdomen, two guinea-pigs. Result as in Experiment (1).

Experiment (6). 1.12.26—Intestinal contents of Rat No. 110,945, mixed with sterile dust on day of capture (30.11.26) suspended in sterile saline after twenty-four hours in the dark at room temperature and injected into the exposed trachea of Monkey No. 1 (same animal as was used in Experiment (3)). Two c.c. of the suspension were used. The animal died in ninety-six hours. P.M. 5.12.26—General subcutaneous congestion on section, general glandular congestion. Excess of free fluid in both pleural cavities with some flakes of lymph in the left. Left lung, lower lobe shows extensive patchy consolidation, greyish-red in colour. Right lung in the posterior portion of the upper and lower lobes shows a similar appearance. Liver and spleen congested. Smears from both lungs showed innumerable *B. pestis*, but the organisms were few in the liver and spleen.

Experiment (7). 4.12.26—Material from Rat No. 111,313, mixed with sterile dust and saline after twenty-four hours in the dark at room temperature. Injected through the exposed trachea of Monkey (3) (*C. patas*). Three c.c. of the suspension were used. The animal died in forty-eight hours.

P.M. 6.12.26—General subcutaneous congestion but no definite gland involvement. Both lungs intensely congested but no consolidation. Sub-pleural haemorrhages, right apex. Slight excess pleural fluid. Spleen and liver markedly congested. Smears from the lungs, heart blood, liver and kidney showed very few organisms, only an odd *B. pestis* being seen. The spleen smear, however, showed a few more.

Experiment (8). 8.12.26—Intestinal contents, Rat No. 111,408, kept twenty-four hours then allowed to dry in sterile dust in the dark at room temperature for three days, then sprayed as dry dust over nostrils and open mouth of Monkey No. 4 (*C. mona*). Result negative.

Experiment (9). 9.12.26—Material from Rat No. 111,856, dried in sterile dust for twenty-four hours in the dark at room temperature and sprayed as in Experiment (8) on Monkey No. 5 (*C. patas*). Result negative.

Experiment (10). 20.12.26—Intestinal contents, Rat No. 113,324, allowed to dry in sterile dust for three hours in the dark at room temperature. Sprayed as dry dust over mouth and nostrils of Monkey No. 5 (same animal as in Experiment (9)) and sprayed as liquid in sterile water over mouth and nostrils of Monkey No. 4 (same animal as in Experiment (8)). Result in both cases negative.

Experiment (11). 21.12.26—Intestinal contents, Rat No. 113,411, kept twenty-four hours in the dark at room temperature, smeared on scarified area, abdomen, each of two guinea-pigs. Result as in Experiment (1).

These experiments indicate that pneumonic plague can be transmitted to monkeys if the intestinal contents mixed with sterile dust and water are not kept longer than twenty-four hours and if they are injected directly into the trachea. Ordinary spraying methods either as dry dust or as a liquid suspension failed to infect monkeys on the four occasions on which the attempt was made. It should be stated here, however, that at a later date (8.1.27) the disease was successfully transmitted to Monkey No. 6 by liquid spraying. The failure to infect guinea-pigs through a scarified area on the skin of the abdomen and the several failures with monkeys as recorded above are not readily explained. But as it has already been noted, the intestinal contents in some cases show a preponderance of organisms other than *B. pestis* and the infectivity of the material may depend partly on the original number of *B. pestis* present, partly on the length of time after the death of the rat (or the deposition of the faeces) and partly on the action of the other bacilli on the plague organism.

The experiments are being continued and attempts are being made to infect healthy rats by feeding them on bread soaked in infected faeces. The results will be communicated in collaboration with Dr. Paisley and Corporal Bowrey, R.A.M.C.

Meanwhile, it is considered that there is a real possibility of human pneumonic plague being contracted by means of infective rat faeces.

EXAMINATION OF WILD RODENTS IN THE MUNICIPAL AREA.

In connection with the examination of wild rodents, Professor A. S. Pearse of the West African Yellow Fever Commission (International Health Board) has supplied the following information:—

“ In connection with my work on Nigerian rodents, I have examined 375 specimens of seventeen species collected from Yaba north to the Lagoon. In all of these I have looked for evidence of plague such as injected glands, enlarged spleen, etc., and in the few cases that looked suspicious I have made smears that were stained with carbol-thionin. In none of these cases did I find plague.”

THE ECTOPARASITES OF THE LAGOS RODENTS.

From 29th September until the end of the year, all the dead rats brought for examination were first of all well shaken, individually, in the disinfectant fluid in which they arrived. The liquid was then poured through a fine-meshed sieve and the retained matter was afterwards washed under a tap into a white basin from which the ectoparasites were readily picked out. A certain number of fleas must have been missed by this method, but the main consideration is that dead rats were being dealt with. From the point of view of obtaining reliable data on the number of fleas per rat, the findings are unsatisfactory. For it is known that rat fleas desert their host as soon as there is realisation that it is no longer possible to obtain a blood meal. Only a very small proportion of the rats received were recently dead and a considerable number were more or less putrid, and therefore in all probability barren of fleas.

In the light of the foregoing explanation, the following figures are given.

The total number of ectoparasites collected in three months from dead rats (9,178) was 1,294, made up of 1,129 fleas, 159 *Laelaps*, five ticks and one *Anopleura*.

The fleas therefore averaged over the whole period in the neighbourhood of one flea to eight rats.

From 29th September to 31st October, 3,036 rodents were dealt with, the term “ rodents ” for the purposes of this account referring exclusively to black and brown rats. From these, 644 fleas were recovered, an average of about one flea to four rats.

In November there were 3,126 rats and 329 fleas, the proportion being nearly one flea to ten rats.

In December, 3,016 rats were examined and 156 fleas were obtained, giving a ratio of one flea to nineteen rats.

Only two species of fleas were obtained, *Xenopsylla cheopis* and *Xenopsylla brasiliensis*. In the first period there were 432 *X. cheopis* and 212 *X. brasiliensis*, a proportion of almost exactly two to one.

In November, there were 217 *X. cheopis* and 112 *X. brasiliensis*, again closely approximating to a proportion of two to one.

In the third period (December) there were 111 *X. cheopis* and 45 *X. brasiliensis*, so that the relation was distinctly more than two to one. It will be observed that although the figures admittedly do not represent the natural number of fleas per rat, they fall into line with accepted beliefs in two ways. In the first instance fleas were most numerous per rat in October, when the incidence of rat plague was highest, and were least numerous per rat in December when the

incidence of rat plague was the lowest of the three months under review. Further, they show a definite preponderance of the known plague-vector, *X. cheopis* over the other flea *X. brasiliensis*.

With regard to live rats, seventy-seven black and eight brown were received at the Research Institute. The custom invariably followed was to put each cage at once into a muslin bag, to prevent the escape of fleas. The bag was opened once a day to allow of feeding the rats. After the expiry of ten to fourteen days (in many instances the rats survived a less period) chloroform was poured over the muslin bag. When a sufficient length of time had elapsed to ensure the death of the rodents and the parasites, a flea count was made. The inside of the muslin bag as well as the fur of the rat was carefully searched. The following figures therefore may be taken to represent actual conditions.

In September, fourteen black rats were received alive. They yielded twenty-seven fleas, *X. cheopis* fourteen and *X. brasiliensis* thirteen, an average of two fleas per rat. In October, three black and two brown rats were obtained. Not a single flea was found.

In November, only one live rat came to hand and no fleas were found upon it.

In December, a steady supply of rats came in. There were fifty-nine black and six brown rats. From these, twenty-seven fleas were collected, *X. cheopis* eighteen and *X. brasiliensis* nine, a ratio of one flea to two rats.

Table III gives the figures concerning the fleas. It includes the collections from both dead and live rats.

TABLE III.

			September.	October.	November.	December.	Total.
X. cheopis	♂		16	266	136	72	490
	♀		12	152	81	57	302
X. brasiliensis	♂		15	136	71	34	256
	♀		11	63	41	20	135
Total	...	...	54	617	329	183	1,183

Males ... 746 X. cheopis ... 792

Females ... 437 X. brasiliensis ... 391

The highest collections of fleas from dead rats were made on two days in October, namely fifty-six fleas from 100 rats and twenty-five fleas from thirty-nine rats. At the other end of the scale, no fleas were obtained from 123 rats on a day in December.

Of the live rats, on one occasion five fleas and on another, four fleas were taken from a single rat.

All specimens of *X. brasiliensis* were dissected and examined. In no instance, however, was the number of plague bacilli sufficient to occlude the alimentary canal at the entrance to the stomach, although in a few cases plague bacilli were found in stained smears from that region. With regard to the other ectoparasites, there were 191 specimens of *Laelaps echidninus*.

The ticks, and the Anopleura await identification. The Honorary Entomologist was responsible for the identification of the ectoparasites.

EXAMINATION OF SPLEEN SMEARS FROM PLACES OUTSIDE LAGOS.

Smears were received from Abeokuta, Ibadan, Ijebu-Ode and Kano. The total number was 2,405 smears.

Abeokuta sent the largest number, namely 1,304, all of which were negative. There were 878 rat spleen smears from Ibadan, none of which showed *B. pestis*. From Ijebu-Ode and district 212 smears were examined, in ten of which the presence of *B. pestis* was demonstrated.

Eleven smears were received from Kano, all of which were negative.

BLACKWATER FEVER.

More or less complete reports have been received, concerning twenty cases of blackwater fever which occurred in Nigeria during the year.

All the cases occurred in male adults, none of whom hailed from Africa. The race is given as—

Australian in three cases.
English in ten cases.
Irish in two cases.
Scottish in five cases.

Officials and non-officials were equally divided, numbering ten each. The Railway supplied four cases, two locomotive drivers, an engineer and a workshop artisan. The other officials were a Superintendent of Education, a diver attached to the Harbour Works, a Captain in the West African Frontier Force, an Assistant in the Secretariat, a Collector of Customs and a Senior Medical Officer. The unofficial group included five employed in general trade, three mining engineers, a timber worker and a Roman Catholic Priest.

Thirteen cases occurred in the Southern Provinces, namely six in Lagos, two in Sapele, and one each in Abakaliki, Asaba, Ijebu-Ode, Onitsha and Port Harcourt.

There were seven cases in the Northern Provinces, two at Jos, and one each at Jemaa, Kano, Makurdi, Minna and Offa.

As regards the time of year, there were three cases in January, one in February, three in March, one in April, two in May, two in June, one in July, one in August, two in September, one in October, one in November and two in December.

The age of the patients is noted as 25, 26, 27 (2), 32, 36, 38, 39, 42 (2), 44 (3), 45, 46, 47, 48, 50, 51 and 55 years.

The total West African service (which in most cases includes leave) was 25, 22, 20 (2), 16, 15, 13, 12, 8, 6 (2), 5, 4 (2), 3, $2\frac{1}{2}$, 2, $1\frac{1}{4}$ (2) and "some" years.

Other tropical experience was possessed by Case (3) "much in tropics" (three years in West Africa), Case (5) Costa Rica three years (four years in West Africa), Case (14) Ceylon three years (West Africa two years), Case (15) South and East Africa and Chili ? years (six years in West Africa) and Case (20) India ? years (sixteen years in West Africa).

The length of the present tour of service was 5, 4, 3, $2\frac{1}{2}$, $1\frac{1}{2}$ (2), $1\frac{1}{4}$ (2), 1 (2), $\frac{3}{4}$ (2), $\frac{1}{2}$ (4), $\frac{1}{4}$ (2), and $\frac{1}{6}$ (2) years.

Quinine was taken prophylactically, with regularity (presumably daily) in three cases, on alternate days in one case, three times a week in one case, was admittedly occasionally missed from the

daily routine in only two cases, was seldom taken in two cases, was never taken in two cases and was taken at irregular intervals in ten cases.

A history of previous malarial attacks was obtained in every case. These attacks are described as frequent in one, repeated in three, many in four and several in twelve.

The facts relating to quinine and the onset of blackwater are :—

Case (1).	Hydrochloride,	grains 5,	5 hours before onset.			
„ (2).	„	„ 20,	12	„	„	„
„ (3).	„	„ 10,	8	„	„	„
„ (4).	„	„ 10,	few	„	„	„
„ (5).	„	„ 10,	7	„	„	„
„ (6).	Sulphate,	„ 1 $\frac{1}{4}$,	few	„	„	„
„ (7).	Hydrochloride,	„ 5,	16	„	„	„
„ (8).	?	„ 10,	72	„	„	„
„ (9).	?	„ 10,	7	„	„	„
„ (10).		NONE				
„ (11).	?	grains 30,	few	„	„	„
„ (12).	?	„ 5,	22	„	„	„
„ (13).	?	„ 5,	17	„	„	„
„ (14).	?	„ 10,	11	„	„	„
„ (15).	?	„ 5,	5	„	„	„
„ (16).	?	„ 5,	23	„	„	„
„ (17).	Hydrochloride,	„ 5,	1 hour	„	„	
„ (18).	„	„ 5,	12 hours	„	„	
„ (19).	?	„ 5,	few	„	„	„
„ (20).	?	„ 6,	12	„	„	„

Case 1.—Five grains quinine hydrochloride was the only dose taken.

Case 2.—Took four five-grain tabloids of quinine hydrochloride during the night, blackwater appearing about twelve hours after the last five-grain dose.

Case 3.—Took ten grains of the hydrochloride in one dose.

Case 4.—Had been taking ten grains hydrochloride daily in five-grain doses for a few days.

In all the above cases, the Medical Officer was called in after the appearance of blackwater.

Case 5.—Subtertian malaria diagnosed 5th March, 1926, given ten grains quinine hydrochloride in solution. 6th March, 1926, given fifteen grains in solution. 7th March, 1926, given ten grains in solution in morning and again in evening. 8th March, 1926, given ten grains in solution in the morning. Blackwater appeared 7 $\frac{1}{2}$ hours later.

Case 6.—On 7th March, 1926 had “ fever ” and took two pills of Esanofele. Fever continued and on 8th March, 1926, took another two pills of Esanofele. On 9th March, 1926, consulted Medical Officer who prescribed mixture which contained quinine sulphate in 1 $\frac{1}{4}$ grain doses to be taken hourly. Six doses were taken but as there was persistent vomiting, most of it probably was rejected.

Case 7.—Took five grains quinine hydrochloride on day before onset.

Case 8.—Took ten grains quinine in tabloid form, three days before the appearance of blackwater.

Case 9.—Took ten grains quinine in tabloid form seven hours before onset.

Case 10.—Took no quinine.

Case 11.—For four days before onset took thirty grains quinine daily.

Case 12.—Took his usual daily five-grain tabloid of quinine.

Case 13.—Had taken five grains quinine daily for “about a week.”

Case 14.—Admitted to hospital 26th August, 1926, and given ten grains quinine in liquid form. On 27th August, 1926, he was given ten grains in liquid form three times, the last dose at 6 p.m. Blackwater, eleven hours later.

Case 15.—Subtertian malaria diagnosed 8th September, 1926, given five grains quinine hydrochloride in solution in the morning and again in the evening. On 9th September, 1926, the same amount was given in the same dosage, last dose at 6 p.m. Blackwater appeared five hours later.

Case 16.—Took a five-grain tabloid of quinine.

Case 17.—Subtertian malaria diagnosed 29th October, 1926, and given five grains quinine hydrochloride in liquid form twice. On 30th October, 1926, this dose was given three times, the last being taken one hour before blackwater appeared.

Case 18.—On 27th October, 1926 took ten grains quinine hydrochloride in tabloid form daily for a week, then five grains daily until 10th November, 1926 when he restarted ten grains daily. Last dose midday 16th November, 1926. Blackwater early morning 17th November, 1926.

Case 19.—Took the usual five-grain tabloid.

Case 20.—Took six grains in powder form $11\frac{1}{2}$ hours before onset.

MODE OF ONSET, SYMPTOMS AND COURSE.

Case 1.—A.R. Felt ill 4th January, 1926, rigor in evening and blackwater seen at midnight. Severe headache, backache, vomiting, jaundice, enlarged spleen. Urine did not clear. Temperature between 100° and 104° F. for three days, then normal. Suppression set in on fourth day and death on sixth day.

Case 2.—K.S. Shivering, backache, malaise, evening of 9th January, 1926. Blackwater 2 p.m. 10th January, 1926. Jaundice, vomiting, enlarged spleen. Urine did not clear. Suppression set in on fourth day, death on tenth day.

Case 3.—A.C. Felt ill, 11th January, 1926. Blackwater 12th January, 1926. Vomiting, jaundice, backache. Urine cleared in three days. Not seen by Medical Officer until 15th January, 1926 when temperature, pulse and urine normal.

Case 4.—J.R. Rigor on 11th February, 1926 (unwell for previous ten days) blackwater on 12th February, 1926. Epigastric pain, deep jaundice. Bilious vomiting. Repeated haematemesis on 13th February, 1926. Stools loose and melaena on 14th February, 1926. Liver and spleen enlarged. Suppression set in on third day, death on fifth day.

Case 5.—J.M. Fever with occasional vomiting for fourteen days. Blackwater on 8th February, 1926, rigor on 9th February, 1926. Vomiting and jaundice slight.

Febrile temperature subsided in seven days, urine cleared in six days.

Case 6.—T.R. On 7th March, 1926 had fever, headache and vomiting. Took two pills Esanofele. On 8th March, 1926 symptoms continued, took two other pills same drug. On 9th March, 1926 consulted Medical Officer, who prescribed quinine sulphate hourly in doses of $1\frac{1}{4}$ grains. Blackwater appeared that evening. Admitted to hospital two hours later. Urine thereafter was clear. There was slight jaundice but no vomiting. The spleen was enlarged.

Case 7.—B.E. Felt seedy on 22nd March, 1926. Blackwater on 23rd March, 1926. Backache, vomiting, diarrhoea and jaundice. Carried one day's journey to hospital. Suppression had then set in. Died 25th March, 1926.

Case 8.—W.P. Felt off colour, 25th April, 1926. Felt better next day but vomited at night. Remained in bed 27th April, 1926 but got up in evening. During the night had rigors and vomiting, temperature 103° F. Seen by Medical Officer 28th April, 1926 just after blackwater had appeared. Jaundice, headache, nausea, tarry stools. Urine cleared on 1st May, 1926 and temperature became normal on 30th April, 1926.

Case 9.—H.F. Felt unwell on 4th May, 1926 vomited in evening and early next morning noticed blackwater. Urine nearly clear by evening, but darker again on 6th May, 1926. Cleared entirely on 7th May, 1926.

Case 10.—P.C. Had fever intermittently for five months. Did not take quinine. On 3rd May, 1926 had fever and shivering in evening. On 5th May, 1926 there was still vomiting and fever and blackwater was noticed in the evening. He was first seen on 7th May, 1926 and admitted to hospital. There were then epigastric pain, vomiting and some jaundice, but the temperature was normal. Haemoglobinuria disappeared on the ninth day of illness but vomiting persisted. Albuminuria which was at first heavy, remained as a haze, during which time there was considerable vomiting, sometimes stercoraceous, and ascites developed. The patient gradually grew weaker and on the eighteenth day began to show a rise of temperature up to 100° F. in the evenings. On the twenty-second day the temperature rose to 103° F. and he died in the evening.

Case 11.—E.A. Headache, vomiting and fever from 25th June, 1926 until 29th June, 1926. No rigor, blackwater evening of 29th June, 1926. Spleen enlarged, sclerae faintly yellow, no febrile disturbance. Urine cleared in thirty-six hours and size of spleen rapidly diminished under quinine administration.

Case 12.—A.F. Felt unfit, evening of 14th June, 1926 with backache, no actual rigor but slight chill. Blackwater seen on morning of 15th June, 1926. Slight nausea, spleen enlarged and tender, liver tender, some jaundice. There was never any vomiting. Temperature fell from 100.8° F. on 15th June, 1926 to normal on 16th June, 1926 and urine cleared on fourth day.

Case 13.—Feeling out of sorts for a week during which the urine gradually darkened in colour. When Medical Officer was consulted (30/7/26), it was dark red. On the following day it was clear. Quinine was exhibited on 4th August, 1926 and gradually increased in dosage until 10th August, 1926 when there was a recurrence of haemoglobinuria lasting twelve hours. The temperature on 30th July, 1926 was 101° F. and became normal next day. On 10th August, 1926 it was again 101° F. becoming normal on 11th August, 1926. There was never any vomiting or any discomfort, but there was marked jaundice. Patient had a double aortic murmur.

Case 14.—A.B. Complained of being seedy for some time. Admitted to hospital, evening of 26th August, 1926 and under quinine treatment the temperature became normal. On the early morning of 28th August, 1926 blackwater appeared and the temperature rose to 102.6° F. Slight jaundice, liver and spleen enlarged. Headache, some vomiting. Temperature normal on 29th August, 1926, no further vomiting, no discomfort. Urine clear on 30th August, 1926.

Case 15.—A.M. Admitted to hospital with subtertian malaria on 8th September, 1926. The temperature was then 103.4° F. On 9th September, 1926 the temperature was normal but blackwater appeared in the evening. On 10th September, 1926 the temperature was 102.4° F. Spleen tender and palpable. No vomiting, slight jaundice. The urine cleared during the morning but was red again in the afternoon, clearing finally in the evening.

Case 16.—J.F. Had a malarial attack, 11th September, 1926 to 14th September, 1926. Black urine noticed in evening of 16th September, 1926. No rigor, some nausea and pains in loins. Spleen enlarged and vomiting slight. Urine cleared on third day.

Case 17.—D.D. Malarial attack on 29th October, 1926, blackwater evening of 30th October, 1926. Backache and headache, no rigor. Vomited once. No jaundice. Temperature 103° F. on 29th October, 1926, 102° F. on 30th October, 1926, normal next day. Urine cleared in eight hours.

Case 18.—E.W. Headache, nausea and pyrexia on evening of 16th November, 1926, which continued until early hours of 18th November, 1926, when blackwater appeared. Temperature 101.2° F., no rigor, spleen enlarged, vomiting, jaundice. Urine cleared after three days, vomiting ceased after second day, but intermittent temperature persisted six days.

Case 19.—F.M. Lassitude for four days, then rigor and blackwater on night of 18th December, 1926. Jaundice observed next day, journeyed to hospital arriving there on 20th December, 1926, temperature sub-normal and urine black. Epigastric and lumbar pain, headache and frequent vomiting. Urine did not clear. Suppression set in and temperature rose to 102.6° F. on 22nd December, 1926. Patient became unconscious and died on 23rd December, 1926.

Case 20.—S.G. Seedy for four days. Had a rigor on night of 28th December, 1926 and blackwater appeared in early morning of 30th December, 1926. Had loin pains and nausea. Both liver and spleen enlarged and tender. Temperature 100.4° F. Temperature normal next day and urine cleared.

There was a fatal result in six cases, the cause of death being suppression of urine in five. In the sixth case there was evidence of abdominal disease, the indefinite nature of the lesion and the precarious state of the patient preventing operative interference.

The duration of haemoglobinuria in the cases which recovered was eight hours, nine hours, twelve hours, one day, two days (4), three days (4), four days and six days. A remission took place in two cases and a relapse in one case. Blood smears were examined by the Medical Officer except in one case. The results are tabulated below :—

CASE.	DAY OF EXAMINATION.	RESULT,
(1)	?	No parasites seen.
(2)	no examination.	
(3)	?	No parasites seen.
(4)	second day	No parasites seen.
(5)	Three days previous to onset of blackwater.	Subtertian rings.
(6)	first day	Subtertian rings.
(7)	?	No parasites seen.
(8)	Two days after urine cleared.	Subtertian rings.
(9)	second day	No parasites seen.
(10)	fifth day	No parasites seen.
(11)	first day	No parasites seen.
(12)	first day	No parasites seen.
(13)	second day	No parasites seen.
(14)	first day	No parasites seen.
(15)	Day previous to onset of blackwater.	Subtertian rings.
(16)	second day	No parasites seen.
(17)	Day before onset of blackwater.	Subtertian rings.
(18)	first day	No parasites seen.
(19)	third day	No parasites seen.
(20)	first day	No parasites seen.

Blood smears were kindly sent to the Medical Research Institute from six cases. Neither parasites nor pigment were seen in any.

A differential leucocyte count was made in each case, and the Arneth formula was also obtained, the count being based on the enumeration of 500 white cells and the formula on the examination of 500 polymorphs. The findings are given in tabular form.

TABLE IV.
DIFFERENTIAL LEUCOCYTE COUNTS.

Cases.	Day.	P.	S.	L.	M.	E.	T.	Ma.	My.	Ery.	Vac.	N.R.
7	second	60·8	18·	2·8	17·2	—	0·6	0·2	0·4	2·	9·	1·
10	fifth	73·6	11·2	2·2	4·4	4·4	3·4	0·4	0·4	—	—	—
16	first	60·	20·8	2·	12·	2·	3·2	—	—	—	—	—
	second	64·8	14·4	2·8	14·4	0·8	0·8	—	2·	—	—	7·
17	second	51·2	19·6	2·8	24·8	—	0·8	—	0·8	—	—	—
	third	34·	41·6	3·2	14·	4·8	2·4	—	—	—	—	—
19	second	84·4	6·8	1·6	6·2	0·2	0·6	—	0·2	1·	3·	—
	third	82·4	9·	0·8	5·6	—	2·	—	0·2	—	1·	3·
	fourth	77·8	7·8	1·8	7·4	0·6	2·6	—	2·	—	—	—
20	second	53·6	12·6	2·	24·6	5·2	1·4	—	0·6	—	3·	2·

In the above Table, P = polymorphs, S = small lymphocytes, L = large ditto, M = mononuclears, E = eosinophils, T = transitionals, Ma = Mast cells, My = myelocytes, Ery = erythrophages, Vac = vacuolated mononuclears, N.R. = nucleated red cells.

TABLE V.
ARNETH FORMULÆ.

Cases.	Day.	I.	II.	III.	IV.	V.
7	second	65·6	26·8	6·8	0·8	—
10	fifth	46·8	34·4	13·2	5·6	—
16	first	56·2	32·4	10·2	1·2	—
	second	50·4	28·2	18·	3·4	—
17	second	86·2	12·4	1·4	—	—
	third	84·4	11·2	4·4	—	—
19	second	71·6	22·8	5·6	—	—
	third	64·8	27·6	7·6	—	—
	fourth	55·2	30·8	12·8	1·2	—
20	second	66·	26·	7·6	0·4	—

There was a history of a previous attack of blackwater fever in five cases.

Case 10.—Patient stated that one month previously, he had passed blackwater for a period of two days.

Case 12.—Had an attack one year previously.

Case 15.—There were two former attacks, the first two years and the second one year previously.

Case 18.—Two former attacks, one twelve years, the other six years before the present one.

Case 19.—Had an attack one year previously.

The following kindly sent reports:—Dr. Blair Aitken, Dr. Boucher, Dr. Cobb, D.S.O., Dr. E. J. Crawford, Dr. R. P. Crawford, Dr. M. W. Fraser, Dr. Gibson, M.C., Dr. Hood Rankin, Dr. Miller, Dr. North, Dr. Pasqual and Dr. C. J. Sharp, M.C.

MALIGNANT GROWTHS.

The occurrence of malignant growths in so-called primitive races has recently aroused a considerable amount of interest. Those who believe that the apparent increase in the number of cases of cancer is due to the artificiality of the present day diet, hold that malignant disease in primitive races is rare owing to their more natural habits as regards food. Unfortunately for statistics, “canned goods” have peacefully penetrated to most parts of Nigeria, but on the other hand the refinements of the restaurant chef are not practised.

A special effort has been made to obtain as many specimens of tumours as possible and the following is an analysis of those received through the special kindness of many Medical Officers.

Squamous Cancer (Epithelioma)	of leg	2.
	of soft palate	1.
	of neck	1.
	of scalp	1.
	of jaw	1.
	of gland	1.
Adeno-carcinoma	of eye	1.
	of testicle	1.
Mucoid carcinoma	of chest	1.
	of cervix uteri	1.

The sarcomata were more numerous, numbering twenty-two but, like the carcinomata were all obtained from native Africans.

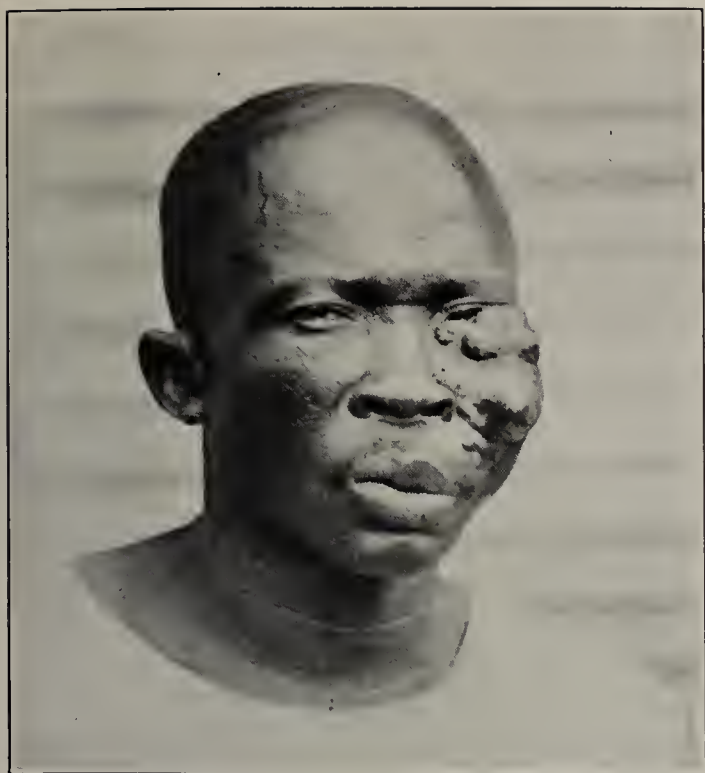
Spindle-celled sarcoma	of face	2.
	of foot	1.
	of finger	1.
	of scalp	1.
Melanotic sarcoma	of foot	4.
Lympho-sarcoma	of thorax	2.
	of jaw	1.
	of intestine	1.
Myeloid sarcoma	of fibula	1.
Glio-sarcoma	of brain	1.
Round-celled sarcoma	of humerus	2.
	of arm	1.
	of chest	1.
	of rib	1.
	of forehead	1.
	of gland	1.

The innocent or simple tumours were :—

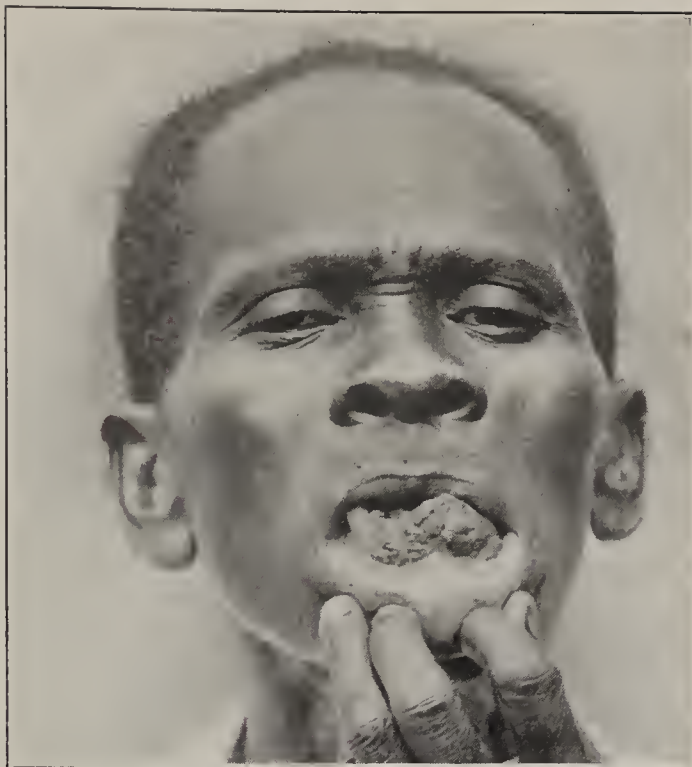
Fibroma	17.	Naevus	1.
Fibromyoma	4.	Myxoma	1.
Papilloma	3.	Adenoma	1.
Angioma	2.	Lipoma	1.
Adamantinoma	2.	Dermoid	1.

Tumours due to other causes were :—

Tubercular disease	of gland	5.
	of testicle	1.
	of epididymis	1.
	of bulbous urethra	1.
Chronic inflammatory	of gland	6.
	of testicle	2.
	of bone	1.
Gumma	of heart	1.
	of finger	1.
	of chest	1.
	of knee	1.
	of gland	1.
	of testicle	1.
Onchocerca volvulus	of chest	2.
	of scalp	2.
	of thigh	1.
Elephantiasis	of scrotum	3.
	of breast	1.
Juxta-articular nodules		3.
Goitre		3.
Retention-cyst, salivary gland,		
	with calculus	1.
Ganglion		1.
Meibomian cyst		1.
Keloid		1.



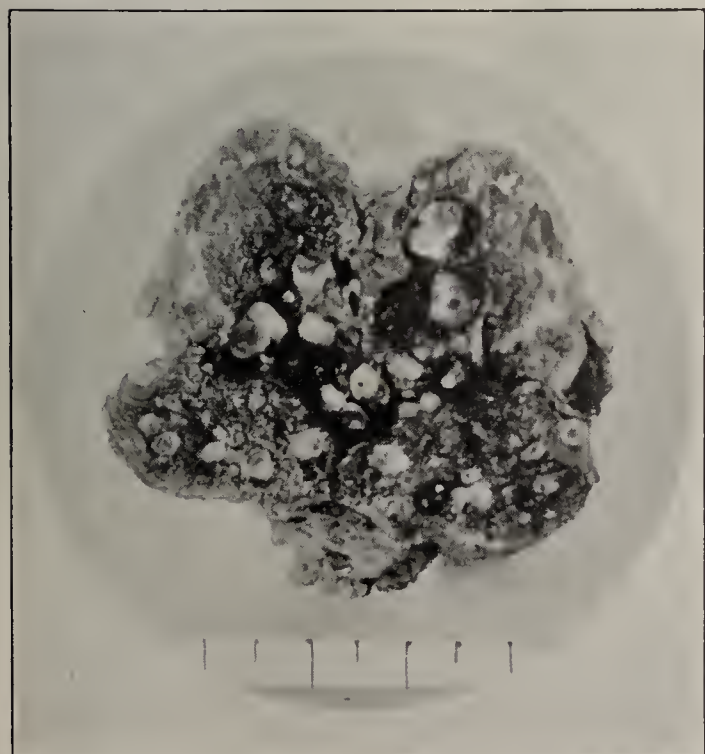
Spindle-celled Sarcoma.



Squamous Cancer.



Goundou.



Salivary gland with calculi.



Cancer of penis.

Other tissues sent for examination were the liver, spleen, kidney and other organs in cases of yellow fever, blackwater fever and relapsing fever; the lungs in several cases of pneumonia, and the brain in cases of meningitis and (in dogs) of rabies.

MISCELLANEOUS.

Sputum.—Seventeen specimens were examined. Tubercle bacilli were found in four and *B. pestis* in one.

Blood.—Nineteen blood smears were examined. *Treponema recurrentis* occurred in one, *Trypanosoma gambiense* in one and *Plasmodium malariae* in one.

The Sachs-Georgi test was done in thirty cases, the result being positive in eleven.

The Widal test was done in ten cases. The serum agglutinated *B. typhosus* in two cases, and *B. paratyphosus* B. in one case.

A few vaccines were prepared.

The Lagos water supply was regularly submitted to a bacteriological analysis, as were also samples from other sources.

Many smears, such as scrapings from various organs and ulcers, from discharges, from faeces and from cerebro-spinal fluid were examined.

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PRICKLY HEAT. ITS AETIOLOGY AND PATHOLOGY.

A paper with the above title by Dr. E. C. Smith was published in the Transactions of the Royal Society of Tropical Medicine and Hygiene, Vol. XX, Nos 5 and 6, of 31st January, 1927, pp. 344-351.

The following is a somewhat condensed form of that paper. *Demonstration of the fungus in the lesions.* Scales from a desquamated area are taken and treated with caustic potash in the usual way. Any mycelial elements are readily recognised under the microscope, but in certain cases, particularly of the more chronic type, hyphae are either absent or very scanty and staining must be resorted to. In any case, staining should always be used as a confirmatory test. The simplest and most satisfactory stain is Gram.

The scales are first placed in strong (forty *per cent.*) caustic potash solution and are transferred in a few minutes to saline. They are then picked up by a platinum loop, placed on a slide, teased out into small fragments and then fixed to the slide by gentle heat.

As the horny cells have a strong affinity for carbol gentian violet, it is advisable to stain with this for only half a minute. The preparation is then treated with Gram's iodine and spirit in the usual way, dilute carbol fuchsin (one in five) for a few seconds being used as a counter stain. The preparation is then dried and examined direct with an oil-immersion lens. The mycotic bodies may be free or may occur within the epithelial cells, singly or in groups. The more usual form resembles a yeast cell in the process of budding, surrounded apparently by a capsule. The bodies vary in size, ranging from two microns in diameter to that of a red blood corpuscle. Elementary hyphae in the form of elongated buds may be seen. The yeast-like bodies show great variation in their capacity for taking up gentian violet stain. Some are an intense purple-black, others show a deep violet stippling and others again have only a capsular staining. These variations may have to do with the age of the bodies. Staining by Adamson's method gives infinitely superior results as regards mycelial elements. The budding forms when stained thus, show one or more darkly-staining dots or masses. Similar dots appear scattered through the hyphae, the whole closely resembling the conditions seen in Pityriasis.

Cultivation of the fungus.—Owing to the small amount of fungus that may be present and to the possible contamination with saprophytic organisms, treating with various strengths of alcohol can be tried but it frequently fails. It is safer to rely on numerous inoculations of suitable mediae. Four or six tubes of Sabouraud's medium can be sown with three or four fragments apiece and kept at room temperature (28.5° C.)—not incubated. The fungus should have definitely appeared within six days as an opaque, creamy-white growth. Occasionally a variety is met with which takes on a striking red colour, like that of red-lead. Such a strain is simple to detect. In the more common white or cream variety, it is advisable to pick off all suspicious-looking colonies and examine them in a drop of saline under a cover-glass, using a high dry lens with a partially closed diaphragm. In positive cases the typical yeast-like appearance of the organism is unmistakable. Frequently the fungus is mixed with cocci or sporing bacilli, so that plating out on dry agar plates and incubation at room temperature will be necessary to obtain a pure growth. Once obtained in pure culture, it can be inoculated on Sabouraud's slopes in large tubes of 1½ inches diameter. After seven days at room temperature, the fungus appears as a flat disc about 1½ centimetres in diameter, with a fairly regular edge and a dry shiny surface. In older cultures, fine striae may grow out from the edge which becomes slightly thickened. The surface, too, may show fine radial markings and also, centrally, small irregular bubbles which later give rise to pits or depressions. Some of the strains isolated grow deeply into the media producing, when cut across, a delicate fan-like appearance. The white and cream-coloured strains tend to darken with age. The red variety may become almost white but several strains of this type have retained their intensity of tint over a period of three months or more. Microscopically, the cultures are found to be composed almost entirely of budding forms, staining Gram-positive, and showing considerable variation in size. Here and there, one comes across a short mycelial filament or an elongated bud, but this is uncommon even in old cultures.

A table is given which shows the sugar reactions of the various strains isolated during the investigation.

TABLE VI.

Strain.	3,113.	1,398.	5,195.	4,891.	D.	C.	Y.	1,758.	1,450.	9,230.	8,790.
Glucose ...	+	+	+	+	+	+	0	+	+	0	+
Lactose ...	0	0	0	0	0	0	0	0	0	0	0
Mannite ...	0	0	0	0	0	0	0	0	0	0	0
Saccharose ...	+	+	0	0	0	0	0	+	0	0	0
Maltose ...	+	+	+	+	0	0	0	+	0	0	+
Dulcite ...	0	0	0	0	0	0	0	0	0	0	0
Dextrose ...	0	0	0	0	0	0	0	0	0	0	0
Galactose ...	0	0	0	0	0	0	0	0	0	0	0
Inulin ...	0	0	0	0	0	0	0	0	0	0	0
Levulose ...	0	0	0	0	0	0	0	0	0	0	?

Note.—Strains D. C. & 1,450 produce gas in glucose only. They possibly therefore belong to the Balanica group of Monilia.

Strains Y & 9,230 do not produce gas in any sugar, are red in colour and may be Monilia rosea, Zenoni.

Experimental inoculation.—Attempts were made in guinea-pigs and rabbits to reproduce the disease and test the pathogenicity of the fungus. Intra-peritoneal and intra-muscular injections and rubbing on a scarified area of a thick emulsion of a twenty-four hours' growth on agar failed, but subcutaneous injection of a similar material usually led to the formation of small abscesses at the site of inoculation, from which the fungus could be recovered, and showing when sectioned a central mass of fungal elements surrounded by a zone of inflammatory reaction.

Human inoculation was performed as follows:—An area of the skin was shaved and washed with saline. A piece of lint one inch in diameter was moistened with a thick emulsion of a twenty-four hours' agar growth, was applied to the shaven area and was kept in close contact by means of adhesive plaster. Four strains were thus tested. As a control a similar piece of lint, moistened with saline only, was applied to a similar area. The incubation period varied slightly with the strain used, but four days was the average time taken for the lesion to develop. On about the second day, however, definite pruritis was felt in the inoculated area particularly after hot drinks and exercise. By the fourth day this area was found to be covered with minute sudaminal or herpes-like vesicles, interspersed with small red papules, the whole being surrounded by an inflammatory condition of the skin. The vesicles are similar to those seen in the early stages of prickly heat but are slightly larger. The contents of the vesicles were negative both in culture and in smears, but on picking off the tops of the vesicles and examining in caustic potash solution, masses of rounded, spore-like bodies were seen, together with some budding forms and hyphae.

A day or two later the vesicles dry up and the area becomes more definitely papular in appearance. Desquamation commences about the seventh to the tenth day from inoculation. It is at first profuse, the scales coming away in large flakes: but later the process diminishes and the scales become finer and more difficult to obtain. The fungus can be demonstrated quite easily in these scales and great variety is presented as regards the size and contour of the fungal elements. When the rounded spore-like bodies are massed together a mosaic appearance results. In other groups the size of the bodies varies from that of a rather fat bacillus to the diameter of a red blood corpuscle. Numerous elongated buds and abortive attempts at hyphae-formation occur. Long branching mycelial strands are also seen many of which show lateral budding. Isolated budding forms can readily be found in the scrapings from an experimental lesion as late as six weeks after inoculation, even although the lesion has not been protected in any way. The mycelium is more prolific in the earlier stages gradually diminishing as the condition ages.

The fungus can be recovered in culture from the scales and if re-inoculated in the same manner it will again produce the lesion. If, instead of inoculating in the way described above, the culture is picked from the agar slope direct and rubbed into the unshaved skin with a platinum loop, the incubation period is greatly diminished and the lesion appears in from twenty-four to forty-eight hours.

Pathology.—On examination of sections of experimentally-produced lesions there are two features of interest (1) the presence of vesicles or pustules and (2) changes in the hair follicles.

The position of the vesicle varies. It may be so superficial as to lie entirely in the horny layer which shows a patchy hyperkeratosis and slight parakeratosis, or it may be situated deeply and encroach upon the corium, separated from it by a compressed and distorted layer of malpighian cells. Again some may show a definite relation to the sweat ducts. Others occur haphazard, frequently lying just to one side of a hair follicle. Many of the vesicles or pustules are seen to surround sweat channels as they make their way through the epidermis to the surface, their thickened, slightly hyalinised walls standing out sharply from the background of the vesicular contents. Serial sections failed to show any connection between these pustules and the lumina of the sweat channels. Here and there, however, a vesicle (or pustule) occurs showing a nodular thickening in its miniature roof. Closer examination reveals in the centre of the nodule a small opening with a hyalinised wall, and on glancing at the corium it will be noticed that the pustule is lying directly over a sweat gland. With the help of serial sections, the floor of the pustule can be shown to merge into the sweat channel arising from the subjacent gland. Whether the pustule has arisen from the sweat gland within, or whether it has merely formed around it, producing disintegration of its walls, is difficult to say. The vesicles in their early stage contain a sero-fibrinous fluid, in which lie groups of separated epithelial cells. Later the inflammatory reaction becomes more intense and the vesicle, or rather pustule is replete with polymorphs and some lymphocytes. The malpighian cells forming the sides and floor of these little excavations are oedematous and the intercellular spaces appear more distinct than normal. Many of the cells have become spindle-shaped owing to the pressure. The cell nuclei are irregularly compressed, pyknotic, and are surrounded by a clear unstained area representing the oedema fluid. Polymorph cells showing much distortion are seen in the intercellular spaces, where they have been fixed on their way to action.

With regard to the staining of the fungus in the tissues, Gram's method will pick out the spore and budding forms and will show their double contour to advantage. The mycelium, however, is stained but poorly. The same remarks apply to haematoxylin-eosin staining; with this method, the peripheral or capsular portions of the bodies take up the haematoxylin, the central parts staining pink, and the mycelium again is poorly stained mainly from a lack of contrast with the surrounding tissues. Loeffler's methylene blue, decolorised by tannic acid gives excellent results when the lesion is confined to the horny epithelium, for the fungus stains a deep blue and shows up vividly against the mauve background of keratinised cells.

The best results, however, have been obtained with alcohol-fixed sections stained by pyronin methyl green. With this stain, both the mycelium and the budding forms take on a deep, dull-red tint which contrasts sharply with the greenish-blue colour of the horny cells. The domed roofs of the vesicles are found to contain groups of fungal elements, the spore forms lying within the epithelium whilst mycelial threads insinuate themselves between the individual cells. The walls and the bases of the vesicular lesions are negative, but occasionally a fragment of mycelium that has become separated is found within the vesicle or pustule.

There are probably two factors responsible for the lesions that are produced (1), mechanical, (2), toxic.

The mechanical factor is the irritation resulting from the presence of a foreign body—the fungus in the cells—this also causing blocking of the intercellular spaces. The toxic factor also arises from the same source, *i.e.*, the fungus.

The combination of these two factors brings about a progressive oedema of the cells in the vicinity, with subsequent disintegration of those most involved resulting in vesicle formation, the vesicles later becoming filled up with polymorphs as the inflammatory reaction increases. With regard to the changes in the hair follicles, the part of the follicle involved is that which passes through the epidermis. The deeper part, or hair root is not altered nor, apparently, is the hair itself. Each affected follicle appears dilated and the cells forming the sheath through which the hairs pass are swollen, oedematous and somewhat more irregularly arranged than usual. Lying within and amongst them are clusters of the yeast-like bodies, some of which are in the budding stage, and an occasional fragment of mycelium. The yeast-like bodies are seen also to occur in an orderly line, closely applied to the issuing hair, so that the latter may be said to pass through a sleeve of fungal elements, this sleeve lying between the hair and the cells of the follicles. Groups of separated spores and hyphae also occur, as already noted, in the follicular epithelium, particularly towards its superficial extremity. Polymorphic leucocytes are seen among the cells bordering the hair follicle. The hairs and also the ducts of the glands (sebaceous) appear to be free from infection.

As well as in the roofs of the vesicles and in the hair follicles, the fungus can be demonstrated throughout the horny layer, more especially in the areas of hyperkeratosis.

In the corium the capillary vessels are distended, their endothelium is hypertrophic and many are packed with inflammatory cells, while an external layer of similar cells surrounds them. Lymphocytes are relatively more numerous here than in the pustules. Mast cells and plasma cells do not appear to take part in the inflammatory process. The sweat glands, beyond having slightly dilated lumina, do not show any notable change. The ducts, however, as they enter the epidermal layer, are here and there accompanied by inflammatory cells. Collections of similar

cells occur in connection with the deeper parts of many of the hair follicles. From the above description it is not difficult to understand why anything which causes increased sweating provokes such acutely irritating sensations in those afflicted with prickly heat. The great prevalence of prickly heat in the hot (and moist) season depends on a number of factors. In the first instance, the skin is presumably sodden by the continuous sweating so that any chance mycotic infection will gain a more certain anchorage and will have a better chance of infiltrating the softened superficial cells. The dampness of the clothes will tend to aid the propagation of any infection which they may harbour and which will, eventually become worked into the skin more easily and abundantly than in a dry state. It is a well-known fact that yeast-like bodies are occasionally found in apparently normal epithelial cells, and it is possible that the infection remains latent for long periods, breaking out only under suitable conditions. It is of considerable interest that it is in those parts which become chafed by clothes that the condition usually starts. In this respect it resembles the *Tinea versicolor* or *Pityriasis* of colder climes. As regards the actual source of infection, it is significant that skin lesions yielding a type of skin fungus identical to that herein described, are rife among the native African population.

SUMMARY.

A fungus showing yeast-like budding forms and branching mycelium, has been demonstrated in the epidermal scales of persons affected with the condition known as "prickly heat."

This fungus can be cultivated from the scales, and when stained appears as masses of budding yeast-like bodies which are Gram-positive. A few of the strains show short, scanty mycelial elements.

By inoculation of a culture of this fungus on human skin, a condition is produced which is comparable to prickly heat in an aggravated form. The lesion which is produced shows a primary vesiculo-papular stage and a terminal desquamatory phase. A fungus identical with that used for inoculation can be demonstrated in the scales, and obtained from them in culture.

The fungus isolated from the experimentally-produced lesion will, on reinoculation, give rise to a similar epidermal lesion.

Sections of the experimental lesion show the presence of a yeast-like fungus in the horny epithelium, in the roofs of the vesicles or pustules and in the superficial parts of the hair follicles.

CONCLUSION.

Prickly heat is a dermatitis of mycotic origin.

The causative agent belongs to the *Monilia* group.

SKIN DISEASES INVESTIGATED IN LAGOS.

Dr. E. C. Smith investigated the skin diseases in Lagos and he has written the Report which follows.

During the year, upwards of 300 patients presenting various forms of skin lesions were examined at the Out-patient Department of the African Hospital, Lagos.

It gives great pleasure to record the help received from the late Dr. W. R. Parkinson, from Dr. Keer and Dr. MacGregor and from the European Nursing Staff. Dr. Smart and Dr. Faderin, in medical charge of the police and of the prisoners, have also been most helpful. Dr. Sapara (Massey Street Dispensary) sent several interesting cases. From Dr. Macaulay (Private Practitioner) cases have also been obtained.

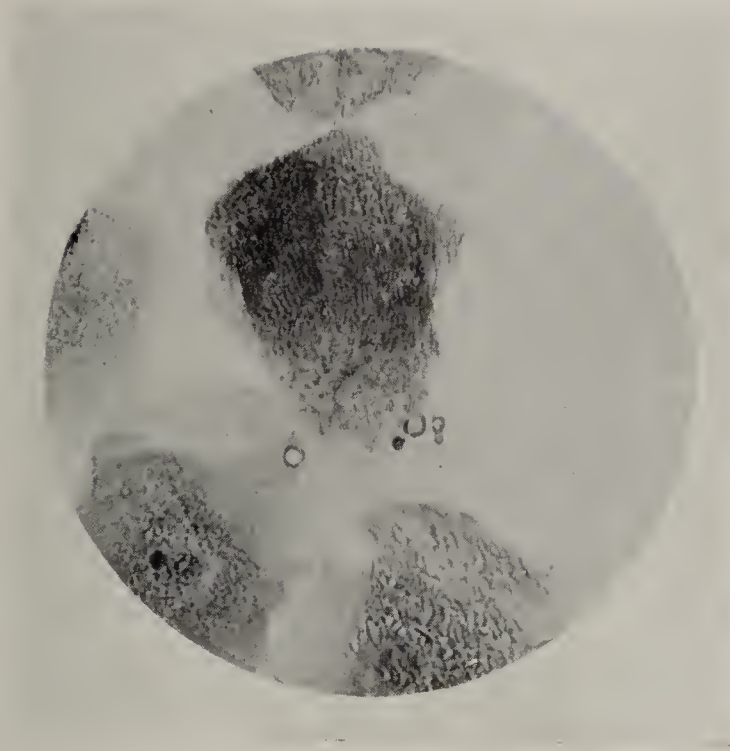


Fig. 1.

Scrapings from a case of prickly heat
showing epithelial scales and spore-
like bodies. (Gram stain $\times 850$.)

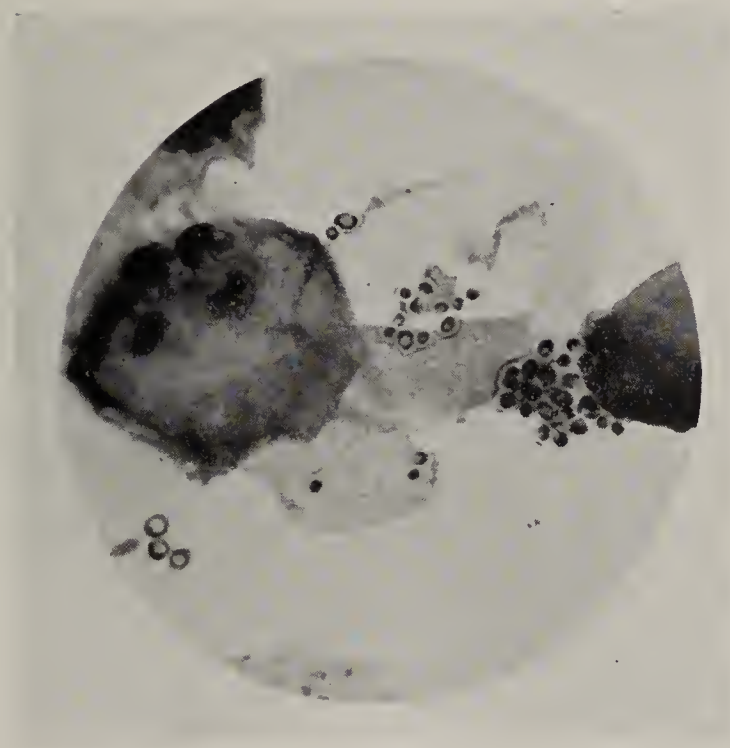


Fig. 2.

Scrapings from a more severe case; showing
clusters of " spores " with well marked
capsules. (Gram stain $\times 850$.)



Fig. 3.

Ten day culture (No. 3113) on Saboraud's maltose agar, at room temperature. The upper colony indicates faintly the fine radial processes extending into the media.

Three-quarters actual size.



Fig. 4.

The same culture, five days later, in transverse section showing the invasion of the medium by the fungus. $\times 2$.



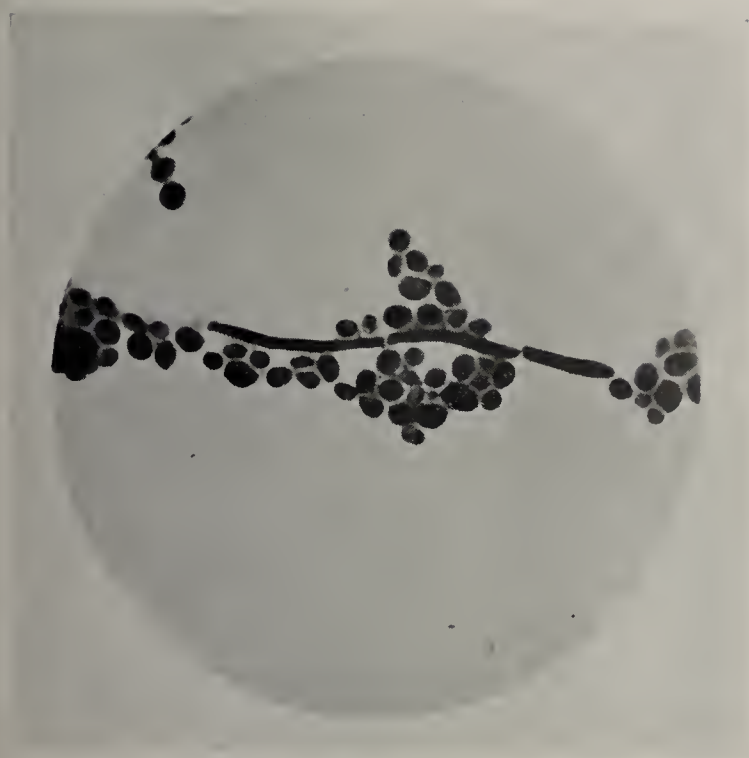
Fig. 5.

Fourteen-day culture (Strain Y) at room temperature on Saboraud's maltose agar. $\times 1\frac{1}{2}$.



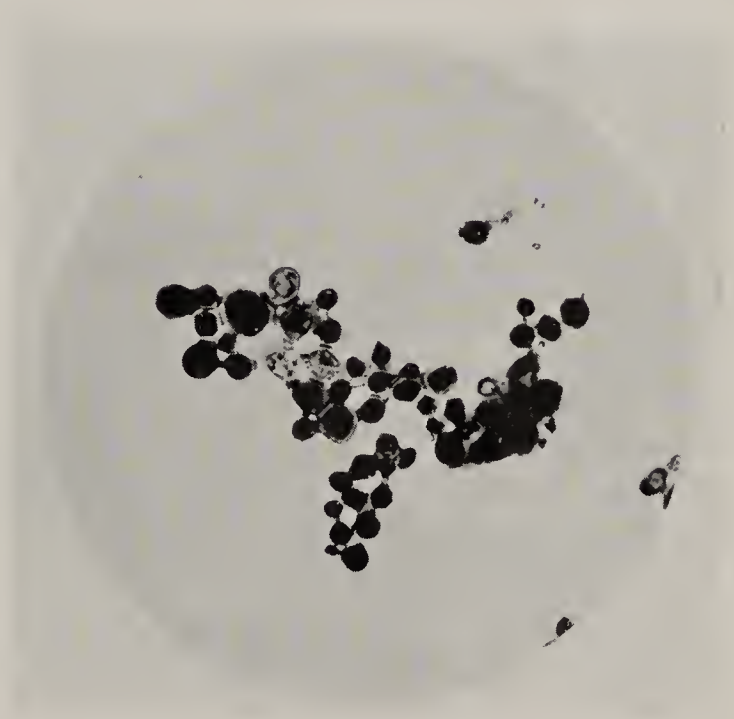
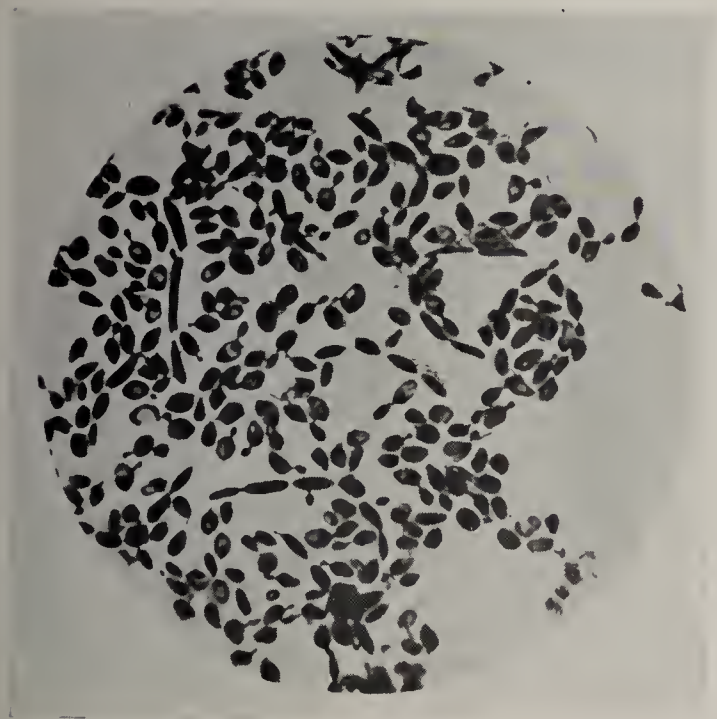
Fig. 6.

Forty-day culture of the same strain. This variety presents the red coloration described in the text. It does not invade the medium. $\times 2$.



Figs. 7 and 8.

Smears, stained by Gram, of a twenty-four-hour culture of No. 3113, showing some elementary hypha-formation. $\times 950$.



Figs. 9 and 10.

Smears made from old cultures (one to three months) showing elongated forms, hypha-formation and stippling of the spore-like bodies. Gram stain. $\times 850$.



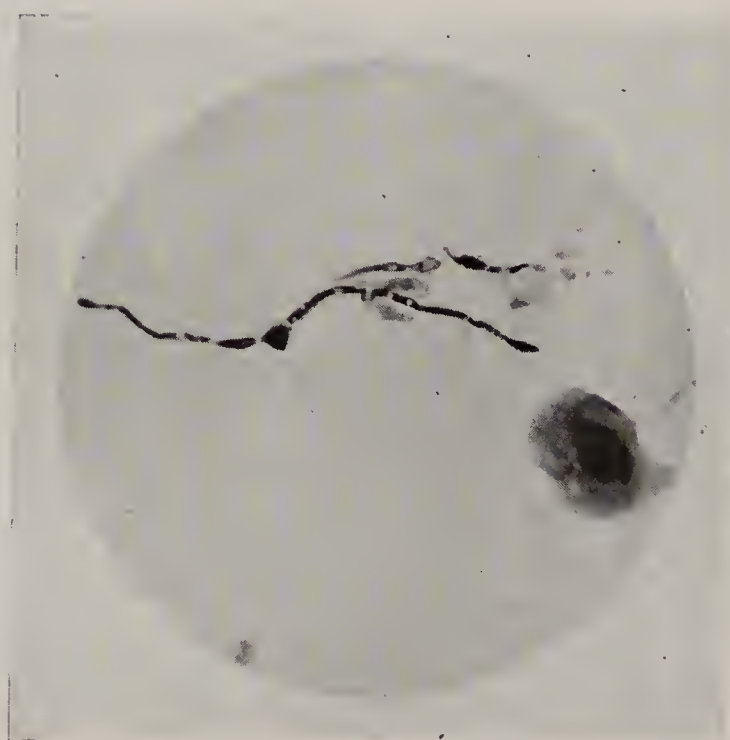
Figs. 11 and 12.

Experimentally produced patches showing
vesiculation. The technique is described
in the text.



Figs. 13 and 14.

The fungus as it appeared in the scrapings from an experimental patch. Gram stain. $\times 850$.



Figs. 15 and 16.

Well-marked mycelium in the scrapings from an experimental patch. Gram stain. $\times 850$.

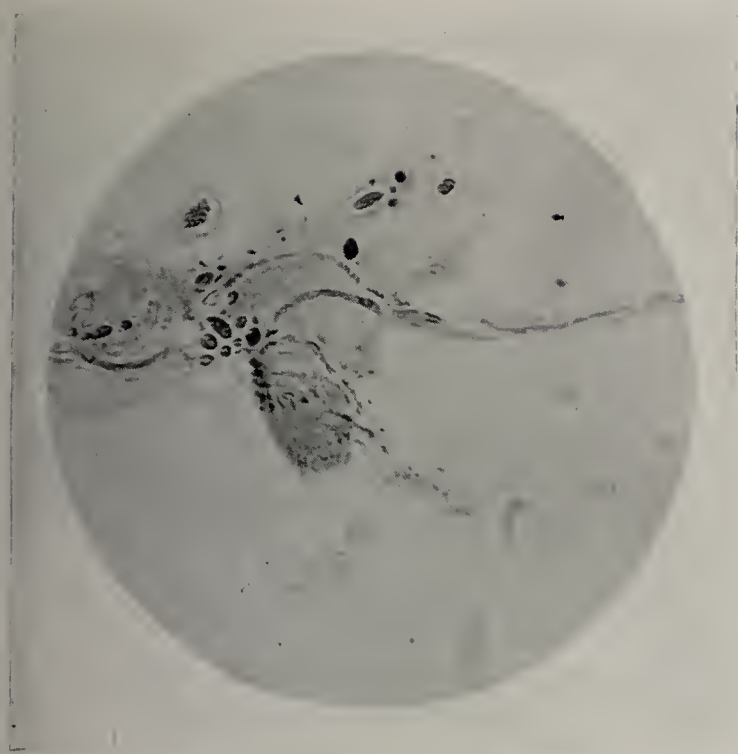


Fig. 17.

Cluster of "spores" and hyphæ showing well-marked capsulation. From an experimentally produced patch nineteen days after inoculation. Gram stain. $\times 850$.

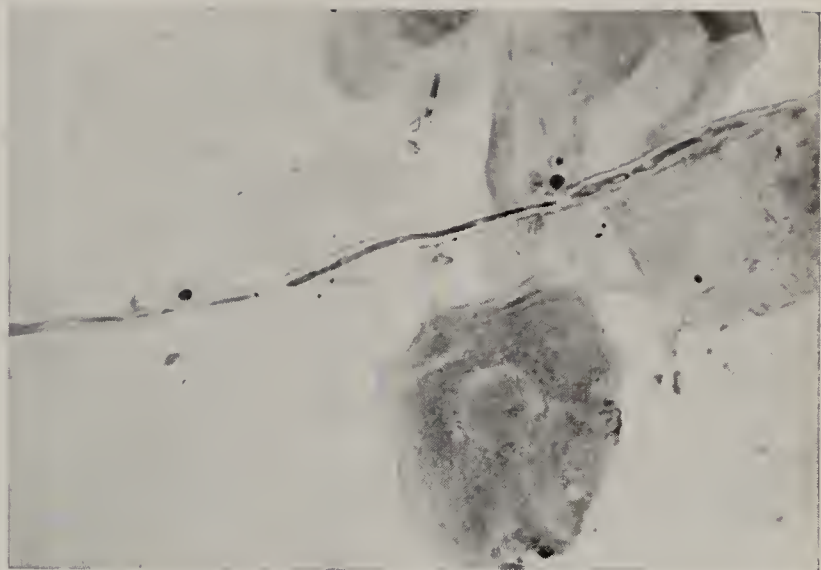


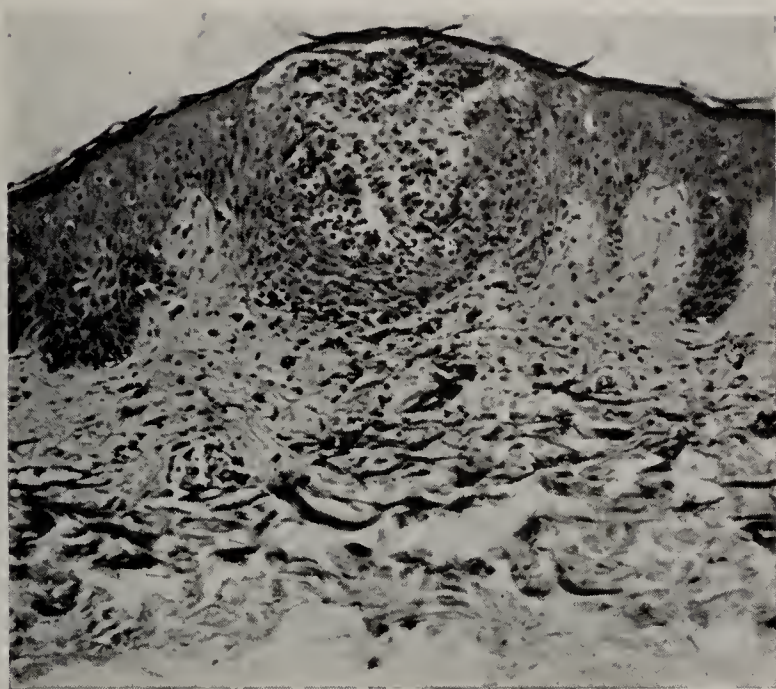
Fig. 18.

A fragment of mycelium from the same source showing lateral budding. Gram stain. $\times 850$.



Figs. 19 and 20.

Scrapings from an experimental lesion showing the close relationship between the fungus and the epithelial scales. Gram stain. $\times 850$.



Figs. 21 and 22.

Sections showing vesicle (more correctly, pustule) formation. The lower section shows a vesicle in relation to a sweat-duct.

From an experimental lesion. $\times 350$.

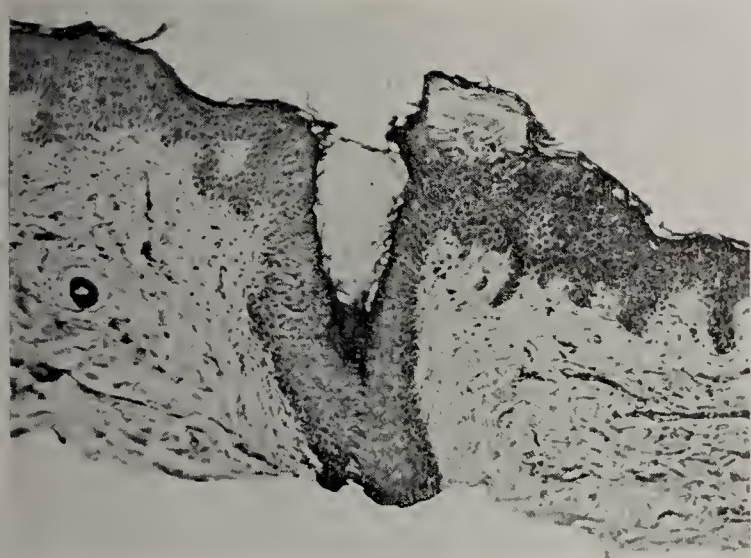


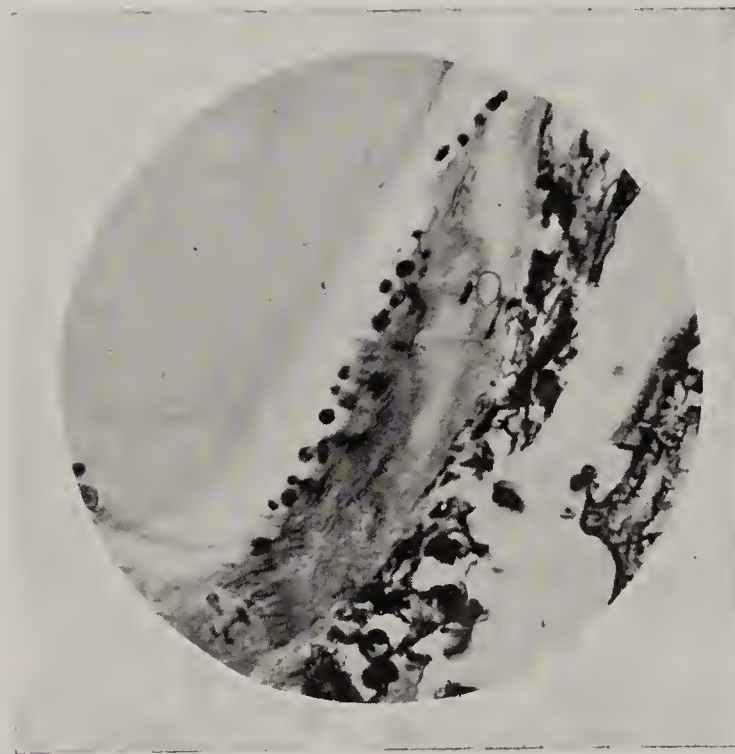
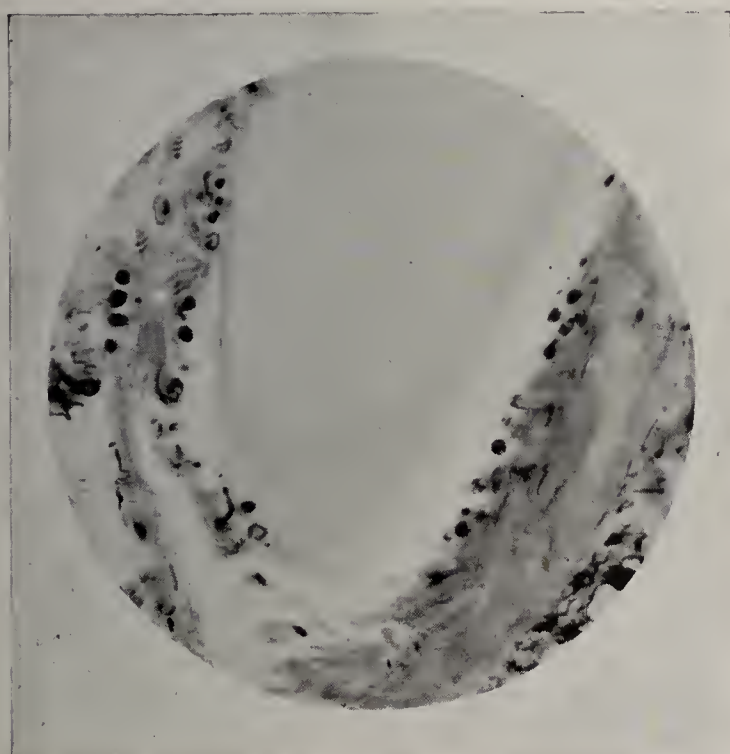
Fig. 23.

Section through a hair follicle showing its increased size and slight inflammatory infiltration of the corium. An adjacent vesicle is also apparent. $\times 90$.



Fig. 24.

Fungal elements in the wall of the follicle shown in *Fig. 23*. Hæmatoxylin-eosin stain. $\times 850$.



Figs. 25 and 26.

Sections of a hair follicle with hair *in situ* showing the position occupied by the fungus. Hæmatoxylin-eosin stain. $\times 850$.

(Microphotographs by Mr. F. W. RANDOLL, Laboratory Attendant).

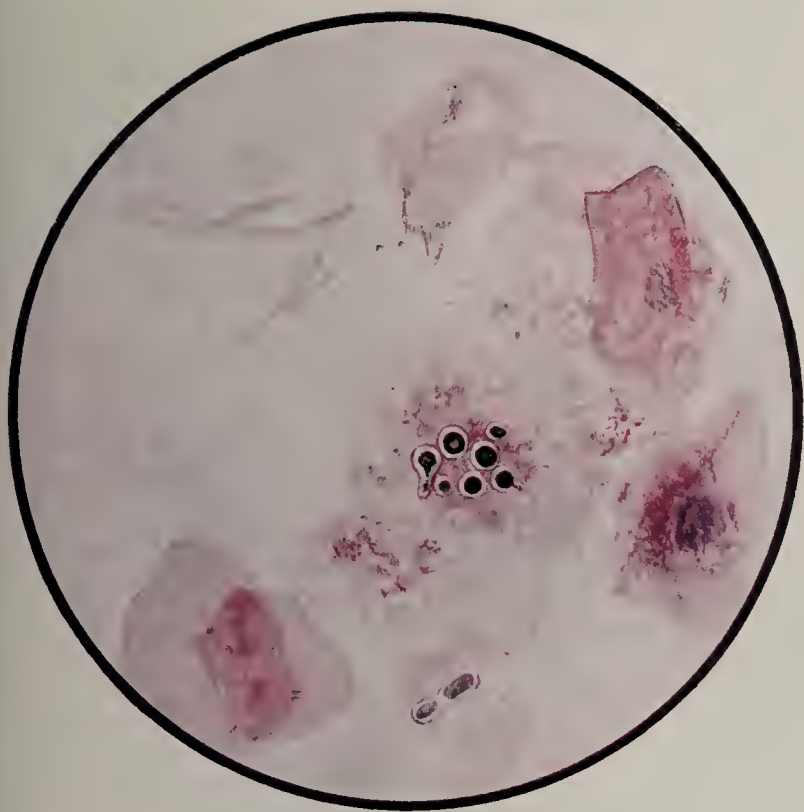


Fig. 27.

Drawing of a typical group of spore-like elements as seen in the scrapings from a case of prickly heat when stained by Gram. $\times 850$.

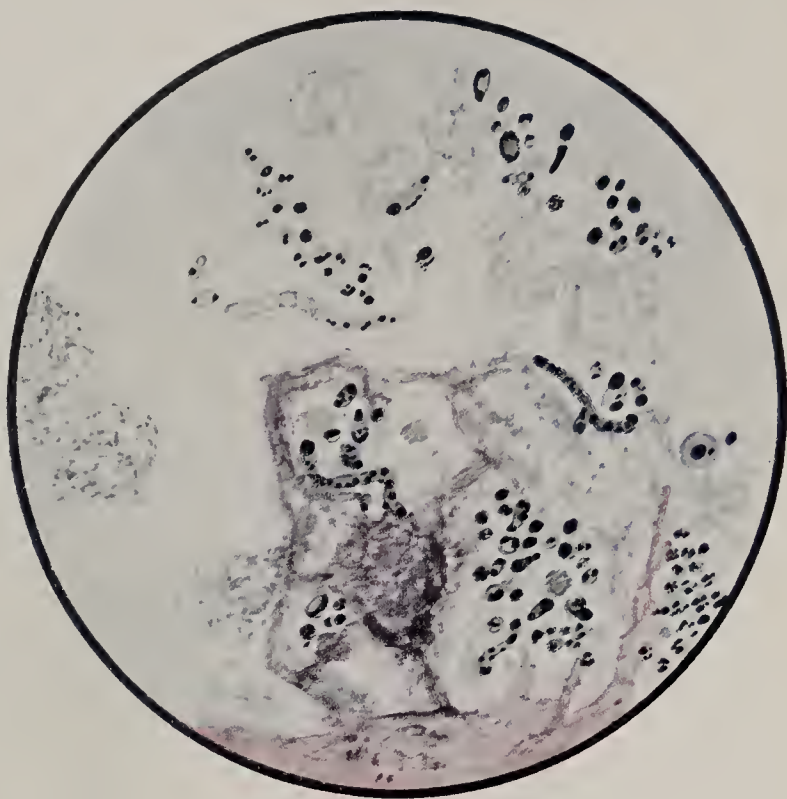


Fig. 28.

The fungus as it appears in the shaved off vesicular tops of an experimentally produced lesion. Staining by Adamson's method. $\times 850$.

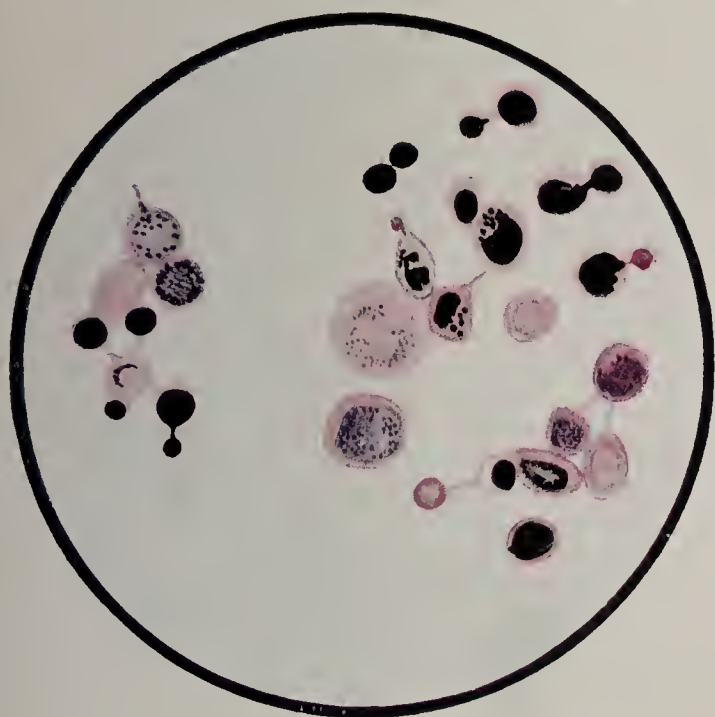


Fig. 29.

Drawing of a smear of a twenty-one day old culture, grown at room temperature on ordinary agar showing bizarre staining effects, and great irregularity in the size of the yeast-like bodies. Gram stain. $\times 950$.

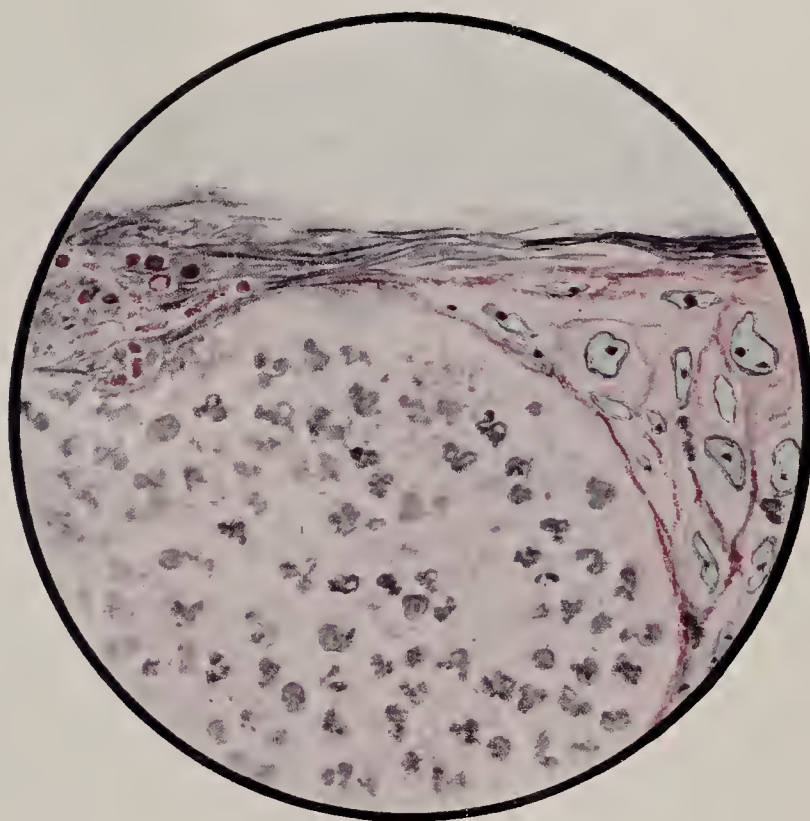


Fig. 30.

Drawing of a section through portion of a vesicle showing mycelium and "spores" in the epithelial cells forming its roof. Alcohol fixation. Pyronin Methyl Green stain. From an experimental lesion. $\times 850$.

As mentioned in the last Report, the method of examination is, wherever possible, threefold:—(I) Microscopical (examination of smears and scrapings); (II) Cultural; (III) Histological (a biopsy is made and the tissue so obtained is sectioned). In many cases, the last method is found to be the most reliable and helpful.

Photographs of the new or more interesting lesions are taken and a clinical record of each case is kept.

The following synopsis will give some idea of the variety of lesions.

	Number of Cases.
Cancer (squamous) (leg ulcer, tumour penis, papilloma back)	3.
Dermatitis papillaris capillitii (sycosis nuchae)	3.
Favus (Achorion Schonleinei)	1.
Herpes Zoster	4.
Kerion (suppurative tinea of the scalp) ...	4.
Lepothrix or trichomycosis	numerous.
Leprosy (one nodular, two anaesthetic) ...	3.
Lichen pilaris	8.
Madura mycosis	2.
Dermal moniliasis	36.
A condition clinically resembling " Mossy Foot "	3.
Onchocerca volvulus (tumour on scalp, tumour on thigh)	2.
Psoriasis (non-syphilitic)	1.
Impetiginous eruptions	10.
Sycosis barbae	2.
Syphilitic ulcers	4.
Simple tropical ulcer	65.
Tinea capitis (varieties not yet classified) ...	20.
Tinea of other regions (unclassified)	51.
Tubercular ulcers	3.
Varicella	4.
Yaws (diagnosis made only when the causative agent found)	7.

A considerable number of cases have been omitted from the above list. This is due to their causation being more or less obscure. It is hoped that as more cases of a similar type are examined, a higher diagnostic percentage will be obtained.

Apart from the above, numerous cases were examined at Port Harcourt, during a brief visit there. Many examples of untreated yaws were seen and the causative agent obtained in smears and sections. A few examples of the condition known as Gangosa were also seen, but as they were under treatment no extensive examination was made.

Leprosy was seen in all its varieties, one case in particular being worthy of mention. The patient, a male adult presented himself with a diffuse papulo-pustular dermatitis, and complaining of pain in the nose. Nasal smears were rich in acid-fast bacilli, as were also the contents of the minute pustules. The organism was also demonstrated in sections of a pustule. Apart from a general dryness of the skin and the nasal pain there was nothing to suggest leprosy, the condition resembling a septic dermatitis. It is interesting to note that leprosy can assume this form.

One case of scabies was diagnosed by finding the parasite and one case of Molluscum contagiosum was noted in a child.

That such an interesting number of cases were seen in a short time (one week) at Port Harcourt was due to the kindness of Dr. H. R. M. Ferguson.

A condition known as "Mossy Foot" has been alluded to. Though bearing a certain resemblance to the "Mossy Foot" of American writers, there is sufficient divergence to show that it must belong to a different group. The lesions, as seen in Lagos, commence as very dry verrucose patches confined to the dorsum of the feet. Later, papules or nodules form which are still covered by the papillated skin. Sections show a vascular granulation tissue, covered by the well-marked papillary epithelial layer and containing numerous infiltrative areas, in some of which giant-cell formation has occurred. Examination for fungi, spirochaetes or acid-fast bacilli have so far been negative. Some of the lesions are not unlike those of *Ichthyosis hystrix* as shown in standard textbooks.

Impetiginous eruptions have been put down as ten in number. This must not be taken as representing a true percentage, as pustular eruptions on the hands are exceedingly common and many seem to have originated in the interdigital clefts. Repeated examinations have as yet failed to reveal parasites (*i.e.*, scabies). Nor do the lesions show any attempt at burrow formation, which is so diagnostic in European cases. Cultures and smears have consistently yielded staphylococci, but it would seem advisable to continue the investigation of these cases before placing them in a septic category.

Several excellent examples of Bockhart's impetigo were met with. Both cases of Madura mycosis were obtained through the kindness of Dr. Gray and Dr. Aitken. The first was a young Syrian girl who presented the typical book-picture of madura-foot. The second case, an adult male native of Lagos, showed lesions which were most atypical. The condition involved the leg and was manifested in the form of indurated areas situated deep to and involving the epidermis. Some of these areas were capped by scabs which, on removal, revealed a minute raw area with sometimes a bead of pus. One such lesion admitted the passage of a probe for several inches. When the areas were opened into, dense scar-like tissue was exposed. At one place the tissue was softer and could be readily scraped away. It is important to emphasise the difficulty which may arise in the diagnosis of such cases. In the first patient, although numerous smears were made, in only one was the fungus recognised.

Smears from the second case revealed nothing beyond the common pyogenic organisms.

In both cases, although eight to twelve blocks of tissue were prepared from each, in only one block from each set was the characteristic fungal mass found. Grains or granules were never noted in the second case. In the first, they were found during the amputation of the foot when a large amount of necrotic bone was removed. Several large yellow grains were then picked out and cultured. The cultures, impure from the first, were eventually over-grown by the secondary organisms. Cultures from the second case were entirely negative.

SIMPLE TROPICAL ULCER AND/OR TROPICAL SLOUGHING PHAGEDENA.

This condition received considerable attention, and the results obtained from the examination of a large number of cases are now given in a condensed form. Fifty *per cent.* of the cases occurred in males. Mostly these were young adults. All the ulcers were in the region of the lower limbs—an important point in etiology—and sixty-two *per cent.* were in the region of the malleoli, the area most exposed to injury when the avocations of life are carried on in bare legs. Almost all the cases gave a history of traumatism, mostly by sharp sticks. The condition is almost invariably described as commencing like a boil or pimple which becomes scratched, then ulcerated, and then rapidly extends. The shape and the extent of

the ulcers vary greatly, according to their duration; and the term "sloughing tropical phagedena" is an apt one, as the majority of them are covered with a foul purulent layer (the result of neglect or of filthy wrappings) which when cleaned away leaves a raw base, composed of granulation tissue and surrounded by a raised, indurated edge. Later, the ulcer may extend deeply and expose muscle, tendon and bone. Neighbouring glands usually show but slight involvement, as the condition is primarily a local one. As regards the etiology of these ulcers, various causative factors have been put forward from time to time. Chief among these are:—

I.—Syphilis.

II.—Yaws.

III.—*Spironema schaudinii* (Prowazek) in symbiosis with fusiform bacilli of Vincent's type.

IV.—Some unknown bacterial agent acting in connection with malnutrition and injury.

Both syphilis and yaws can produce ulcerated lesions and there is always the possibility of such a condition forming the starting point of the so-called "ulcus tropicum." Apart from the possibility of such a coincidence, however, there is no etiological relationship. In support of this view, the following facts are mentioned:—

- (a) The spirochaetes of syphilis or yaws have not been found in smears made from the ulcers in Lagos, when examined by darkground and by Fontana's method of staining.
- (b) Many of the patients were young children. They presented none of the lesions characteristic of congenital syphilis.
- (c) In fifteen typical cases (under the supervision of the late Dr. Parkinson), full courses of N.A.B. (four to six injections of 0.6 gramme each) were administered. No improvement took place, the ulcer either remaining stationary or definitely retrogressing.
- (d) A large majority of the cases, when kept at rest and treated with simple dressings (saline, Balsam of Peru, hot stupes) rapidly cleared up.

It remains to show whether the *Spironema schaudinii* (Prowazek) or another organism is the etiological factor.

Reference must first be made to some experimental work which was carried out in connection with this type of ulceration.

Adult guinea-pigs were inoculated subcutaneously with amounts varying from one to two c.c. of an emulsion made from such ulcers in saline. In some of the animals death occurred within twenty-four hours. Post-mortem examination revealed a severe broncho-pneumonia, and sometimes also, splenic abscesses occurred. In such animals, cultures from the heart, lungs and spleen all yielded a profuse growth of a small, Gram-negative bacillus, which was motile. The condition, therefore, was a septicaemic one. Other guinea-pigs showed merely a generalised congestive condition with here and there minute haemorrhages, cultures from the various organs being negative. At the site of inoculation, however, an oedematous, green-stained area is usually found, which when incised exudes a thin greenish fluid rich in Gram-negative motile organisms readily obtained in culture. These animals apparently die from a toxæmia, the organisms remaining localised. Again, in a certain number of animals, a rapid rise of temperature (103° to 105° F.) occurred on the day following the injection. The tempera-

ture rapidly subsided and about the fourth to the sixth day the site of injection was marked by a large abscess, giving rise later to a spreading ulcer which eventually healed within a few weeks. (*See* table of inoculation experiments). Smears from these abscesses and from the resultant ulcers showed large numbers of motile Gram-negative bacilli, many of them lying within polymorph cells. The organism at times assumed a diplococcal form. Cultures were easily obtained and they frequently developed an intense bluish-green colour, later changing to brown (*Bacillus pyocyaneus*). If the contents of one of the experimental abscesses were aseptically aspirated (*i.e.*, before the abscess had burst), and afterwards injected subcutaneously into other guinea-pigs, in quantities varying from 0.5 to 2 c.c. exactly similar results were reproduced. The contents of the abscesses were repeatedly examined by the dark-ground method but no spirochaetes were found. Cultures and smears made from the ulcers in man and taken after thorough cleansing with saline, yielded an organism similar to that obtained from the experimental lesions. When obtained in pure culture and inoculated into guinea-pigs, identical results were obtained, as above.

Though many of the cases healed up completely with simple remedies, particularly saline and Balsam of Peru, there were a certain number which resisted all treatments or healed up only to break down again. In some of these cases marked improvement was obtained by autogenous vaccine treatment. It is possible of course, that such amelioration could be explained on the principle of "Protein shock." An interesting point, however, was brought out by the vaccine treatment. It so happened that on several occasions a case treated by a vaccine had healed, the patient's serum agglutinating his own strain of *B. pyocyaneus* up to one in 250 or higher. Then a freshly broken-down area would appear and spread rapidly over the whole original ulcer site. A strain of *B. pyocyaneus*, not agglutinated by the patient's serum could be obtained from this area. A fresh vaccine made from this second organism would produce healing and endow the patient's serum with new agglutinating properties. Evidently, then, in some cases a re-infection may occur with a different strain of *B. pyocyaneus*.

From a few of the most stubborn cases, a pure culture of a diphtheroid was obtained, but such cases were unusual.

It has been claimed that cures of these ulcers have been obtained by prolonged N.A.B. treatment. Such statements are apt to be misleading, because, as has already been seen, ulcers of a syphilitic origin are in the minority in Lagos. Again, when N.A.B. treatment has been given over a long period, it is difficult to know whether the improvement has been effected by its specific or by its general tonic action. In any case, such patients are being treated either as indoor or outdoor, so that local treatment in the form of clean dressings is being provided, which in itself greatly conduces to recovery.

Autopsies were made on several cases of simple tropical ulcer. In only one case, however, was the time interval sufficiently short to exclude the possibility of post-mortem infection. This case is described below.

Case J.Z. Male. Age eighteen years. Admitted to African Hospital 29th March, 1926.

Died 6th August, 1926.

Autopsy made within one hour of death.

History.—On admission the case presented an irregularly ulcerated area on the posterior and lateral aspects of the left leg in its lower third just above the malleoli. He was treated with Eusol dressings and Pot. Permanganate baths. Slight improvement.

followed. A vaccine was made and six doses 0.5 up to 4 c.c. were administered at intervals of four days. This produced a marked temporary improvement, but the ulcer broke down again within a few weeks and the patient began to run an irregular temperature between 99° and 101° F. A new vaccine was started on 17th May, 1926, but had no effect, the ulcer spreading and exposing a portion of the Tendo achilles. Cultures gave a pure growth of *B. pyocyaneus*. A third vaccine was made and large doses given (1, 2, 4 and 6 c.c.). This coincided with much improvement in the general condition of the patient, the febrile temperature subsided and he became more cheerful. A month later the ulcer broke down again and commenced to undermine the surrounding skin. The patient was now given six doses of N.A.B. of 0.6 gramme each. No improvement was noticed, he became gradually weaker and again exhibited an irregular temperature. Compounds of bismuth and mercury were also used in the treatment but were of no avail. The patient died a month later.

Post-mortem.—Marked emaciation. Abdominal fat very scanty. Skin dry and atrophic.

Abdomen. Large intestine distended with gas. No excess fluid in peritoneal cavity. No peritonitis.

Small intestine slightly inflamed in its middle portion.

Small soft glands were scattered all through the gastro-colic omentum and the mesentery.

Kidneys normal in size, somewhat tense. Opaque on section.

Cortex relatively wide. Vessels distended. Capsule strips easily.

Liver. Large and cut surface dull and slightly granular in appearance. Negative for amyloid change.

Stomach contains green-stained fluid. No apparent inflammation.

Spleen small and firm.

Appendix, pancreas and suprarenals normal although the last was pale in colour.

Thorax. Heart. Valves normal. Aorta perfect. Muscle tissue dark and rather soft.

Lungs. No pleural adhesions. Substance of the organs very pale, collapsed, tough and doughy in consistence.

Small darkly-mottled lymph glands in both groins.

Cultures made on Agar and in broth from—

Heart blood.

Spleen.

Kidneys.

Liver.

Glands in groins.

Glands in the mesentery.

All were negative.

Smears were also made from the organs mentioned. No bacteria or spirochaetes were found in them when stained.

Sections were made from all the organs. The only findings worthy of record are those in the sections stained for fat by Sudan III.

Heart.—Cells showed well marked staining granules at each nuclear pole.

The condition was one of “ Brown atrophy.”

Liver.—Diffuse fatty degeneration involving the whole lobule and merging peripherally into blotches of fatty infiltration.

Kidneys.—Faint traces of fatty degeneration.

From these findings it would appear that the condition was a toxaemic, not a septicaemic one.

It has to be recorded that the smears from nearly all the ulcers examined showed the *Spironema schaudinii* and the fusiform bacilli of Vincent's type. In sections, too, these organisms may be found in large numbers, at times forming a narrow band just deep to the surface of the ulcer. They are admirably demonstrated by Giemsa staining. In view of their almost constant presence, it is possible that they are a factor, either in the causation or in the persistence of the ulcers, but if that be so, it seems strange that the lesions do not yield to Salvarsan or to its allied compounds. Conditions in the mouth, such as Vincent's angina, produced by an apparently identical organism, heal rapidly under treatment with Salvarsan.

With reference to the role which *B. pyocyaneus* plays in connection with *ulcus tropicum*, the question of the production of agglutinins to that organism in the patient's blood arises. It has to be recorded that in the present series, there was only one case in which a positive agglutination was obtained with the serum of the patient (one in fifty), apart from vaccine administration.

The organism, however, may act by producing a toxaemia in the majority of cases, only becoming generalised and causing a septicaemia in isolated instances. It is interesting to note that a bacteriophage, active for *B. pyocyaneus* was obtained from several of the cases under investigation. Pure cultures of the spirochaetes and the fusiform bacilli were obtained in hydrocele-glucose-agar broth under anaerobic conditions but no results followed animal inoculations (guinea-pigs) of such growths.

The problem may be resolved into the following parts:—

- I.—Are the spirochaetes (*Sp. schaudinii*, Prowazek) alone responsible for the disease or are they merely saprophytic?
- II.—Is *Bacillus pyocyaneus* alone responsible or is it merely a contaminating agent?
- III.—Do the spirochaetes referred to act in symbiosis with *B. pyocyaneus*, or even with other organisms in order to bring about the condition?

Taking into consideration the results of investigation detailed above, along with the history, the site, and the frequent complete healing with simple dressings, it is suggested that *Bacillus pyocyaneus* is a possible causative organism, aided by malnutrition and fatigue on the part of the patient.

Summary.—Syphilis and yaws have no relation to “ Tropical sloughing phagedena ” (*ulcus tropicum*).

Strains of *Bacillus pyocyaneus* of considerable virulence have been isolated from numerous cases of *ulcus tropicum*, and have produced similar ulcers on experimental inoculation into guinea-pigs.

The spirochaetes obtained by culture from the ulcers have yielded no experimental results.

GP. No.	Material used.	Temperature.	Result.	Cultures.	Smears.	Remarks.
1.	Saline emulsion of material from case of Ulcus tropicum. Dark-ground shows masses of spirochaetes and fusiform bacilli. Subcutaneous inoculation, in two places, $\frac{1}{2}$ cc. each.	2nd day, 104.5° F. 3rd day, 103.4° F. 5th day, 102° F.	Two days after inoculation areas were gangrenous. Slight greenish discharge. Six days after inoculation, definite ulceration, about 1 cm. in diameter. Thick white discharge. Ten days later, ulcer began to heal.	Positive for a Gram-negative, motile bacillus.	Many Gram-negative bacilli. No spirochaetes or fusiform bacilli seen.	Dark-ground examination of the discharge in saline showed no spirochaetes or fusiform bacilli.
2.	Pus from an ulcer tracking up leg. Emulsion in saline, $\frac{1}{2}$ cc, inoculated subcutaneously, and $\frac{1}{2}$ cc. injected into testis.	2nd day, 105.1° F. 3rd day, 103.6° F. 5th day, 102.4° F.	Small ulcer at site of subcutaneous inoculation on 6th day. Purulent discharge. Testis showed a temporary swelling. On 7th day, ulcer began to heal.	B. pyocyaneus is present.	Small fat Gram-negative bacilli.	Dark-ground examination negative for spirochaetes.
3.	Same emulsion as No. 2. 2 cc. injected subcutaneously in the abdominal region.		Died next day. Large gangrenous area corresponding to site of injection.	B. pyocyaneus is present.		Juice from organs negative for spirochaetes. A few found in fluid from gangrenous area.
4.	Emulsion in broth of material from an ulcer. Dark-ground shows abundant spirochaetes and fusiform bacilli. $\frac{1}{2}$ cc. injected subcutaneously.	2nd day, 104° F. 5th day, 102° F.	5th day, indurated, inflamed, swollen area with soft fluctuating centre. Ulcer formed 9th day. On 17th day, healing nearly complete.	B. pyocyaneus is present.	Gram-negative bacilli numerous.	Dark-ground examination of discharge negative for spirochaetes and fusiform bacilli.
5.	Broth culture (48 hours) of a Gram-negative bacillus isolated from a case of simple tropical ulcer. $\frac{1}{2}$ cc. injected subcutaneously. This strain developed a well-marked blue colour on culture.	2nd day, 104.5° F. 3rd day, 103.6° F. 5th day, 101° F.	4th day, indurated, inflamed area. 5th day, fluctuation present. 6th day, ulcer formed, thick purulent discharge. 20th day, healing well advanced.	Pure culture of a Gram-negative bacillus, both before and after ulceration.	Gram-negative bacilli, many intracellular.	
6.	1 cc. same material as in No. 5 used injected subcutaneously.	2nd day, 105° F. 3rd day, 100° F.	3rd day, animal dead. Skin of abdomen oedematous and greenish in colour.	B. pyocyaneus in organs and exudates. All gave marked coloration.	Gram-negative bacilli numerous.	P.M. Small abscesses at site of inoculation, with zone of inflammation.
7.	$\frac{1}{2}$ cc. 48 hour broth culture of Gram-negative motile bacillus obtained in pure culture from a case of simple tropical ulcer. This strain never produced any coloration on culture. The inoculation was made subcutaneously in the abdominal region.	2nd day, 104° F. 3rd day, 105° F. 4th day, 103.5° F. 7th day, 101.5° F.	4th day, indurated area. 6th day, fluctuation present. 7th day, small ulcer formed and remained discharging until 10th day, when healing commenced.	Pure cultures of a Gram-negative bacillus from the discharge.	Gram-negative bacilli numerous.	Bacillus used would be grouped as pyocyaneoid. Many such were isolated, identical with B. pyocyaneus except its inability to produce pyocyanin.
8.	Subcutaneous inoculation, 2 cc. broth culture, same organism as was used in No. 7.	2nd day, 104° F. 3rd day, 103° F. 4th day, 100.5° F.	Inoculated area gangrenous and oedematous on 3rd day, dead on 4th day.	Positive cultures organs and exudates.	Gram-negative bacilli numerous.	Sections of organs showed Gram-negative bacilli.
9.	1 $\frac{1}{2}$ cc. 48 hour broth culture of a strain of B. pyocyaneus isolated from a case of ulcus tropicum. Subcutaneous inoculation.	2nd day, 105° F. 3rd day, 104° F. 4th day, 102.5° F. 6th day, 101° F.	7th day, large irregular ulcer, edges indurated and undermined in places. Thick pus obtained on squeezing, 13th day, ulcer commenced to heal.	B. pyocyaneus in pure culture from pus.	Gram-negative bacilli numerous.	
10.	2 cc. 48 hour broth culture, strain of B. pyocyaneus from case of tropical ulcer.	2nd day, 105.8° F. 3rd day, 105° F. 4th day, 104.5° F. 5th day, 102° F.	Animal very ill on 4th day, muscular twitching. Died on 5th day.	Positive cultures from spleen and heart.	Gram-negative bacilli numerous.	Sections of spleen showed clumps of Gram-negative bacilli in the abscess areas.



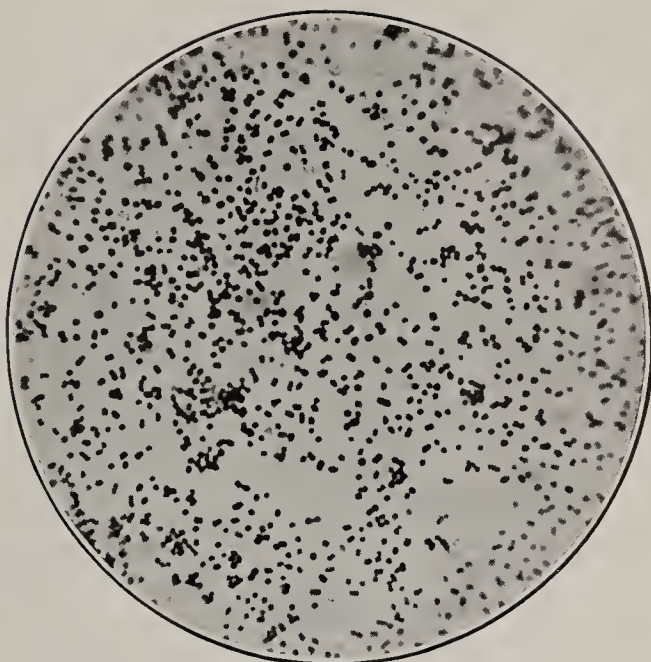
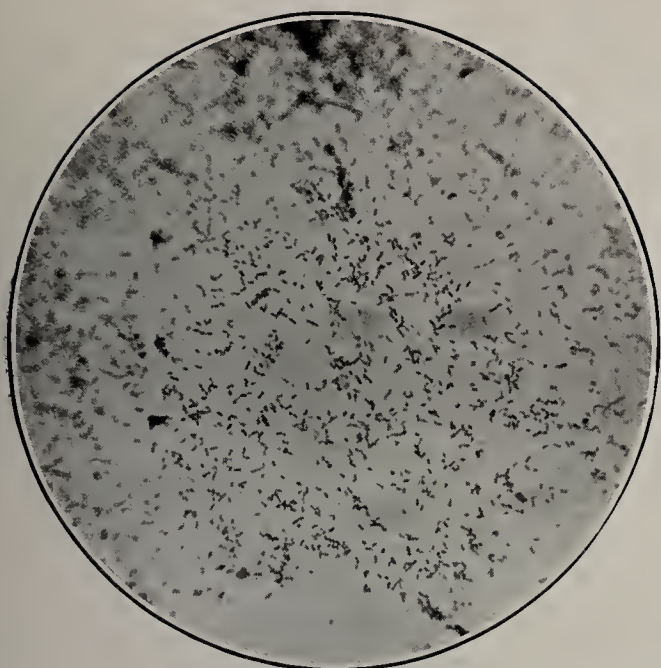
EXAMPLES OF TROPICAL ULCER.



EXAMPLES OF TROPICAL ULCER.



EXAMPLES OF TROPICAL ULCER.



B. PYOCYANEUS FROM CULTURE.



EXPERIMENTAL TROPICAL ULCER IN GUINEA-PIGS.





EPITHELIOMA CONTAGIOSUM.

The naked eye appearances, post-mortem, in the guinea-pigs which died as the result of inoculation were as follows:—

G.P. No. 3.—Scattered peritoneal haemorrhages, forming fused areas at region of injection. Fibrinous exudate present in peritoneal cavity. Lungs very congested. Heart soft and flabby.

G.P. No. 6.—Small abscess at site of inoculation, surrounded by a zone of inflammation. Lungs show numerous minute abscesses, surrounded by intensely congested zones. Liver pale and swollen. Spleen swollen and very congested. Haemorrhagic areas in abdominal muscles.

G.P. No. 8.—Marked oedema of abdominal and thoracic muscles. Haemorrhages and small abscess areas in the peritoneum. Omentum congested and showing numerous abscesses, densely adherent to small intestine and to anterior abdominal wall, at site of inoculation. Liver shows multiple minute abscesses. Lungs are congested and show haemorrhages and abscess formation. Kidneys show minute subcapsular haemorrhages. Stomach and alimentary canal acutely inflamed.

G.P. No. 10.—Spleen markedly enlarged, with irregular abscess areas similar in appearance to infarcts. Liver enlarged, pale and cloudy. Kidneys show no apparent change. Lungs show marked patchy congestion.

EPITHELIOMA CONTAGIOSUM.

Epithelioma contagiosum (Geflügelpocke). A small epidemic of this interesting condition occurred in Lagos. In all ten chickens were fatally involved. The typical crusted protuberances were present about the eyes, beak and comb of the birds (*see* photographs). Sections showed the presence of the inclusion bodies in the protoplasm of the epithelial cells. Inoculations into pigeons and rabbits proved negative.

A PATHOLOGICAL SYNOPSIS OF FIVE FATAL CASES OF YELLOW FEVER.

A brief account of the pathological appearances, both gross and microscopical, is given.

The disparity between the findings in the five cases recorded, and their deviation in certain respects from the classical description of yellow fever, are strikingly brought out in the tabular statement appended. It would, however, be somewhat premature, in the present state of our knowledge to set up a pathological standard of macroscopic and more particularly of microscopic appearances in West African yellow fever.

Macroscopic appearances—

Jaundice.—This is variable in tint, is most constant in the sclerae and is usually of a lemon-yellow colour.

Petechiae.—They are common in the facial area but may be diffuse.

Liver.—Pale yellow-brown in colour, with at times a greenish tinge.

The organ may be enlarged. The margins are firm. The cut surface has a dry dense appearance and the edges remain sharp and distinct. A hand lens is desirable for the examination of the cut surface. The lobulation can be made out in some cases, the central veins being apparently surrounded by pale areas giving place to reddish coloured zones peripherally. In the cases in which necrosis has occurred to

a more advanced degree, there is a uniform yellowish-brown appearance. Faint mottling may be present. The tissue is not especially friable and may even show a certain degree of elasticity. Fine subcapsular ecchymoses may occur.

Spleen.—Beyond congestion, this organ shows little change.

Kidneys.—The perinephric fat may show a bilious tinge. The capsule strips easily, leaving a smooth matt surface with well-marked stellate veins. In cut section the cortex appears to be increased and suggests an early degree of fatty degeneration. The amount of bile staining is usually small. Recent blood clots in the pelvic region were found in one case. The glomeruli frequently stand out sharply as minute congested points.

Stomach.—The contents are usually darkly stained and are soupy in consistence. Mucus shreds are visible. After washing, a fairly characteristic condition is seen, in the nature of haemorrhagic areas, varying in position and punctate in character. These haemorrhages tend to be situated on the crests of the mucous plicae, so that a linear or striped appearance results.

Duodenum.—May show an appearance similar to that seen in the stomach, but a more diffusely injected condition is more usual. The ampulla of Vater participates at times in the inflammatory congestion.

Small intestine.—Haemorrhages may be present in the wall.

Mesenteric glands.—They may be slightly enlarged and congested.

Heart.—The muscle tissue is somewhat flabby and lustreless. When opened into the muscle is dull and opaque-looking. There is no other evidence of degenerative change. The heart valves and the ascending aorta frequently show an icteric tint.

Lungs.—Oedematous and congested, especially posteriorly. Blotchy sub-pleural haemorrhages rather similar to those seen in purpura haemorrhagica are found mainly along the posterolateral and apical aspects. A frothy blood-stained fluid exudes from the cut surface. Slight crepitation is present. A lobar pneumonia was present in one case.

Post-mortem records—

Mrs. E. (1½ hours after death).

General.—Very corpulent. Skin greenish yellow in tint, also sclerae.

Cyanotic areas on forehead, abdomen and limbs.

Thorax.—No excess fluid in pleural or pericardial cavities. Chronic adhesions left pleura. Minute petechiae under parietal and visceral layers. Lungs markedly congested. When cut, a blood-stained frothy fluid exudes. Dark haemorrhagic areas scattered throughout the organs. These areas are not sharply defined from the surrounding tissue, nor do they project above the lung surface. Pieces of lung taken from different regions float in water. No bronchial inflammation. Trachea showed considerable inflammation.

Muscular tissue of heart soft and flabby. A few small petechiae on surface. When opened, the endocardium particularly in the region of the valve cusps distinctly jaundiced.

Abdomen.—No excess fluid, no petechiae.

The stomach showed blotchy congestive areas when opened. These occupied the lesser curvature and faded gradually into

the surrounding mucosa. No definite haemorrhages seen. Contents of organ watery, with mucus shreds and darkly stained flakes floating therein.

Duodenum, diffusely injected and of a dark red colour. Nothing of note in remaining portions of small intestine, except that in the caecal region there was slight congestion, with bile-stained contents.

Liver slightly enlarged with a smooth surface. In cut section the colour was light buff, uniform throughout with the exception of diffusely scattered minute red dots. These could not be identified with the central veins. The normal lobular formation was lacking.

The gall-bladder was partly filled with a thick viscid bile. Pancreas congested.

Spleen normal in size, dark in colour. In section the pulp was very dark, the lymph follicles showing up very clearly. Kidneys, slightly enlarged and soft in consistence. The surrounding fat was definitely jaundiced. Capsule thin and stripped easily. When sliced open, the cortex was relatively wide, swollen and of an opaque appearance. The cut margin of the organ tended to evert. The glomeruli could be discerned in places as minute congested points. A sharply-defined wedge-shaped area, dark in colour was present in the left kidney. A renal vein connected with this area was found thrombosed. The thrombus was a recent one.

Adrenals apparently normal.

Bladder showed hypertrophy of walls.

Mr. C. (1½ hours after death)—

General.—Well-built. No wasting. Icteric tint marked on face where petechiae also present. No rigor mortis.

Thorax.—No excess pleural fluid. Lungs voluminous and oedematous. Hypostatic congestion posteriorly, and also darkly coloured haemorrhagic areas scattered all through the organs. The tissue is crepitant and crackles when cut, with exudation of a frothy fluid. The lungs float in water. The oedema and haemorrhages are more marked in the right lung.

Heart: Muscle tissue appears firm, but when cut it presents a dull clouded appearance. No haemorrhages seen. Slight chronic endocarditis of mitral valve. Some early atheromatous patches in aorta.

Tonsils swollen but firm. Submucous haemorrhages present in trachea.

Abdomen.—No excess peritoneal fluid.

Stomach: Fluid contents tarry in colour, with darkly stained mucus shreds. Mucosa congested, with small ecchymotic areas, especially at the pyloric end.

Duodenum: Congestion in upper portion. No haemorrhages seen.

Liver: Normal size. Pale brownish-yellow in colour. Markedly firm and elastic. The cut surface resembles box wood and is dull and dry. The surface is quite uniform and no haemorrhages are visible. The normal liver structure cannot be made out.

The gall-bladder is collapsed.

Spleen: Normal in size, congested on cut surface, with prominent malpighian bodies.

Kidneys: Normal shape and size. Capsule strips easily. Cut surface is firm but cloudy looking. Cortex and medulla show a normal relationship.

Adrenals normal.

Bladder contracted, containing only an ounce or so of urine. No evidence of inflammation.

Mr. M. (1½ hours after death)—

General.—A lean small-framed man. Rigor mortis has not set in. The skin over the entire body is lemon yellow in colour, as are also the sclerae. A number of petechiae on chest and thighs. The cut surface of the skin is yellow in the dermis. There is almost no subcutaneous fat.

Thorax.—Pleural surfaces free from exudate. Right lung shows extensive consolidation in its lower, middle and a part of its upper lobe. Left lung shows a moderate amount of hypostatic congestion. Heart muscle firm. Its cut surface is pale brown. The valves have a yellow colour. The aorta is atheromatous.

Abdomen.—The sharp free edge of the liver extends three inches below the right costal margin. The organ is firm. The external surface shows a good deal of brown and red in the general yellow colour. The cut surface on being scraped is decidedly yellow. The lobules appear small and irregular in size and poorly defined. The bile in the gall-bladder is dark and stringy.

The kidneys are red. The capsules strip easily. Cortex and medulla can be distinguished. In the medulla, particularly of the left kidney there are a number of small haemorrhages.

Some scattered petechiae are seen in the cortex. Mucosa of pelvis decidedly yellow.

The spleen is somewhat enlarged. It is firm and the cut surface is blotchy.

The stomach contains about four ounces of very dark thick liquid.

The mucous membrane is slightly reddened and shows many minute redder spots.

The duodenum appeared normal.

The pancreas and the bladder showed nothing noteworthy.

Mr. A. (6½ hours after death)—

General.—Body well-developed and nutrition good. The skin over the entire body is light yellow in colour, except on the back where it is obscured by P.M. lividity. The sclerae are yellow. The cut surface of the skin is yellow but the dermis is white.

Thorax.—Dense pleural adhesions cover the entire left lung. The right lung is free. The cut surface of both lungs is frothy. Particularly in the right there are small irregular haemorrhagic patches with here and there small areas showing broncho-pneumonic changes. The heart muscle is firm. The epicardium shows a number of petechiae. The cut surface of the muscle is pale brown with just a trace of yellow. The valves are faintly icteric.

Abdomen.—The liver edges are sharp. The organ appears only slightly, if at all enlarged. The external surface is mottled, some areas being yellow and others purple. The organ cuts very easily. The cut surface oozes a red material which on scraping off leaves a yellow colour. The lobules can be distinguished showing three zones, a peripheral greyish-yellow, an intermediate red ring and a central portion of a greyish-yellow colour.

The kidneys are reddish-brown. The capsule strips with difficulty. The cut surface shows medulla and cortex clearly. Where cortex joins medulla there is a faint yellow zone. The medulla shows red streaks. The mucosa of the pelvis is icteric and there are a few scattered petechiae.

The stomach contained a dark liquid in which floated dark red flakes. The mucosa was a deep pink, most marked along the rugae.

The duodenum also showed a pink mucosa.

The spleen was enlarged. The cut surface was smooth.

The pancreas and the bladder showed no abnormality.

Miss U. (one hour after death)—

General.—Body well-preserved. Generalised dull greenish tint most marked on the sclerae. Small petechiae present, mostly on the face.

Thorax.—Lungs oedematous and congested, particularly posteriorly. Small subpleural haemorrhages on apical and postero-lateral aspects. Extensive fibrous adhesions on right side.

The heart is firm and its colour is pale. When opened the valves are seen slightly stained a yellowish-green. There was no evidence of myocardial degeneration.

Abdomen.—No excess fluid present. Discoloured patches discretely disposed throughout the small intestine.

The stomach contained about eight ounces of a black soupy fluid in which mucus shreds were floating. Punctate haemorrhages were present. In the region of the cardiac orifice these were grouped to form linear tracks, corresponding to the summits of the mucous folds. This linear formation was very striking.

The duodenum was diffusely congested. The ampulla of Vater was markedly congested and inflamed. Pressure on the gall-bladder caused a ready flow of normal-looking bile.

The liver was definitely enlarged. The colour was a pale straw-green. The consistence was firm. The cut edges remained sharp. With the aid of a lens, pale areas could be seen around each central vein, surrounded by a congested zone.

The spleen was soft and congested. The malpighian bodies were prominent.

The kidneys were large, their size increasing on removal of the capsule. Cortex large and pale. Recent haemorrhages were noted surrounding the ureter and vessels as they entered the organ at the hilum.

The adrenals appeared normal.

The pancreas showed nothing abnormal.

A HISTOLOGICAL ANALYSIS OF FIVE FATAL CASES OF YELLOW FEVER.

The organs showing the most marked changes are the liver, the heart and the kidneys. Even in these "key" organs, great variation of changes is presented.

Liver.—The amount of degeneration (fat staining) varies within wide limits. There may be only a peripheral fatty zone or the process may involve the whole lobule so that nothing is distinguishable but the portal tracts.

In one case there was a marked peripheral and also a central fatty zone. In between was a mid zone devoid of fat. At first sight this last appeared to be an unaffected area. Such was not the case, however, as an examination of haematoxylin-eosin-stained sections showed that this zone exceeded the others in regard to degenerative changes: it was composed of cell remnants, dilated capillaries and haemorrhagic areas (the mid-zonal necrosis of da Rocha Lima). This was fairly well shown in two cases.

Heart.—Three of the five cases showed complete fatty degeneration of the muscle fibres. The other two were entirely negative. In all, vascular congestion was present.

Kidneys.—Fatty degeneration was well-marked in two cases. In these the tubular condition suggested a sub-acute inflammation, in that the cells lining the tubules were "low" in character, the lumina of the tubules being correspondingly wide. In such cases the tubular contents consisted mainly of hyaline globules of varying size, massed together in the collecting tubules to form casts. In some of the casts a fairly definite structure was visible (*i.e.*, cellular casts).

The glomeruli all showed congestive changes, accompanied as a rule by fibrinous exudation into the glomerular space, the lining membrane of which showed hypertrophic changes. Lime casts were not noted. The vessels shared in the congestive changes but only in one case were definite haemorrhages present.

Spleen.—The interpretation of pathological changes in this organ is always difficult, and this difficulty was increased in some of the present cases owing to the presence of malarial pigment. Haematoidin crystals were noted in one case. In two there was cellular exudation around the larger veins as they traversed the trabeculae.

Stomach.—In all the cases congestion of the vessels in the mucous and submucous layers was evident. Extravasations into the mucous layer were frequent. In places, superficial membranous patches were present, composed mainly of extravasated blood cells and necrotic mucous membrane.

The duodenum was involved in a much milder degree. The remainder of the alimentary tract showed nothing significant.

Lungs.—Haemorrhagic areas almost like infarcts were a constant finding. Apart from these intra-alveolar haemorrhages, there were frequently subpleural petechial extravasations. In one case a lobar pneumonia (grey hepatisation stage) was present on the right side. Hypostatic congestion was usually marked.

Nothing of interest was noted in other organs.

	Mrs. E.	Mr. C.	Mr. A.	Mr. M.	Miss U.
LIVER.	<p>Parenchyma appears granular and vacuolated. Isolated tags of liver cells around portal tracts. Congestion of vessels in the tracts and a diffuse round cell infiltration also present. Nuclei in many cells are lacking, others show chromatolytic and pyknotic changes. When present they are mostly central. Capillaries full of blood cells are seen separating the adjacent rows of cells. Some lymphocytes have migrated from these vessels and lie scattered through the parenchyma. Greenish-brown fine granules of pigment fill some of the hepatic cells and mask their structure.</p>	<p>From without there is first a layer of intact cells around most of the portal tracts. These give place to degenerated and finally to disintegrated cells. As the central vein is neared, a second fairly intact layer is seen. The part showing most change is mid-lobular. Fine greenish-brown stippling is seen in some cells. Dark green granules occur in many of the inter-cellular spaces.</p>	<p>Liver cells recognisable only around the portal tracts where they occur as a thin broken band. Centrally the cells become granular and vacuolated, with no nucleated. The intervening capillaries are greatly distended and have formed small scattered hæmorrhages. Considerable chronic infiltration (small round cells) is present around the portal tracts.</p>	<p>Normal lobulation is present. Some of the central veins are the site of small hæmorrhages but many are surrounded by a band of fairly well preserved liver cells. A similar band surrounds the portal tracts so that, sandwiched between the two layers is a zone of necrotic hepatic cells. The endothelial, Kupfer and some liver cells show well-marked greenish pigment granules. The portal tracts are infiltrated with lymphocytes, and the bile ducts contain cast-like structures, (inspissated bile?).</p>	<p>Portal tracts are surrounded by broken-up groups of intact liver cells mixed with cells showing various stages of degeneration. Round the central vein, liver cells are vacuolated and their nuclei are degenerated. Between the two zones is an area, varying in width, of necrotic liver cells, their outlines faint, their protoplasm vacuolated and the nuclei lacking. Lying in between these cell-ghosts and compressing them are the distended blood capillaries, sharply marked off by the swollen endothelial cells, from the necrotic groundwork. The portal tracts show a round cell infiltration. Pigmentary deposits are very scanty.</p>
HEART	<p>The muscle fibres are widely separated and the fibrous tissue between is oedematous. Vessels congested. Nuclei of cells degenerated and in many cases absent. The fibres have a clouded, granular appearance, their normal striation being lost.</p>	<p>Fibres separated and vessels congested. Most of the fibres show nucleation and brown pigment. Striation indistinct and fibres show granulation.</p>	<p>Nucleation present but the protoplasm of the muscle fibres is granular and devoid of striation. The vessels are greatly engorged and contain greenish-brown specks.</p>	<p>The fibres are distinctly granular but the normal striation can be distinguished. The vessels are congested.</p>	<p>Fibres cloudy in appearance, but the striation is visible. The nuclei stain faintly and show chromatolytic changes. Congestion of the vessels is present.</p>
SPLEEN.	<p>Marked vascular congestion and distension of sinuses. Halos of inflammatory cells (mainly lymphocytic) surrounding the veins in the trabeculae. Malpighian bodies enlarged and outline irregular. Two varieties of pigment, black granules sometimes obscuring the nuclei, and crystalline globules, probably hæmatoidin in the endothelial cells.</p>	<p>Congestion and sinusoidal distension. Malpighian bodies well-marked. Pigment laden cells numerous. Capsule thickened.</p>	<p>Marked congestion of splenic pulp. Pigment granules scattered throughout the organ.</p>	<p>Congestion marked. Generalised pigmentation.</p>	<p>Congestion of the pulp tissue with numerous pigmented cells. The pigment is in the form of irregular brown granules. The veins as they lie in the trabeculae show a slight amount of surrounding cell-exudation (mostly lymphocytes).</p>
LUNGS.	<p>Areas of hypostatic congestion. Hæmorrhages in scattered areas, filling the alveoli. There are areas of compensatory emphysema.</p>	<p>Hypostatic congestion and hæmorrhages present.</p>	<p>Capillary congestion and extravasations which fill the alveoli. Some of the areas resemble recent infarcts.</p>	<p>Consolidated area shows an early stage of grey hepatisation, the alveolar spaces being filled with polymorphs.</p>	<p>There are areas in which the alveoli are full of blood cells. These are surrounded by zones of compensatory emphysema. Sub-pleural hæmorrhages are present.</p>
STOMACH.	<p>Some hæmorrhagic extravasations into submucosa. Cells are swollen and many have disintegrated.</p>	<p>Extravasation into submucosa. Round-cell infiltration into loose connective tissue of villi. Epithelium lacking in places.</p>	<p>Vascular congestion of mucous and submucous coats. Some patchy necrosis of the epithelial cells.</p>	<p>Mucous membrane is congested, with superficial collections of red cells lying on it. Small hæmorrhages in mucosa.</p>	<p>Surface of mucous membrane is necrotic, and in many places small extravasations of red blood cells have occurred forming delicate membranous patches. Vessels of submucous and muscular layers are congested.</p>
KIDNEY.	<p>Tubular epithelium is as in acute nephritis. The epithelium is "high" its free surface is ragged, and by crumbling has formed a granular material which in the collecting tubules appears as homogeneous hyaline casts. Nucleation is fairly good, especially in the collecting tubules. There is marked congestion of glomerular tufts, and hypertrophy of the endothelium. Some glomeruli appear to be anchored to their capsule by a delicate fibrinous exudate. Vessels congested and contain fine greenish brown pigment. A similar but coarser pigment is free and also in many of the tubular epithelial cells. Capsule apparently normal.</p>	<p>Tubular epithelium "low", leaving wide lumina filled with an amorphous substance. Many nuclei are shrunken and distorted but some are in fair preservation. The tubular contents are mostly cellular. Dark green pigment granules occur. Glomerular capillaries congested, with much swelling of the endothelium and exudation into the glomerular space. Vessels congested and contain fine pigment. Capsule normal.</p>	<p>Tubular appearance is as that seen in cases of commencing sub-acute nephritis. Epithelial cells tho' high in type, do not completely fill up the lumina, which contain a granular material and hyaline casts. Most of the cells retain their nuclei; but their protoplasm is granular and vacuolated. The glomeruli are very congested, with slight exudate into the glomerular spaces. Cellular lining of Bowman's capsule is very prominent. Vessels congested. A few small extravasations. Capsule thin.</p>	<p>Tubular epithelium is "low" and lumina are distinct. They contain a scanty coarsely globular detritus. Some of the nuclei show chromatolytic changes. In some of the collecting tubules, homogeneously-stained casts appear. Capillary congestion is present, with some granular exudate into the glomerular spaces. The vessels are congested. Capsule shows slight irregular thickening.</p>	<p>Tubular epithelium is "low" in type, the lumina are relatively wide and contain irregular sized globules of a pink-staining substance. In the collecting tubules, these globules apparently coalesce to form the so called colloid casts. Epithelial cells are granular. Glomeruli congested. In many of the glomerular spaces, globules similar to those in the tubules are present. The lining epithelium is swollen, individual cells showing up here and there like miniature frog-spawn. A granular substance is also present in many of the spaces. Vessels tho' considerably congested, have not given rise to hæmorrhages. Capsule shows some oedema and vascular congestion.</p>

HISTOLOGICAL CHANGES IN THE ORGANS OF THE INDIVIDUAL CASES.

A. FAT STAIN (SUDAN III).

	Mrs. E.	Mr. C.	Mr. A.	Mr. M.	Miss. U.
LIVER ...	Has undergone complete fatty change. The only parts not involved are the portal tracts. The lobular arrangement has completely disappeared. The intracellular fat globules show much variation in size. Around Glisson's capsule they are mostly small and give a stippled appearance to the cells but groups of larger globules occur. Here and there the larger globules are more numerous at some distance from the portal tracts. The fat-laden rows of cells are separated from each other by distended capillaries.	Presents a much milder parenchymatous degeneration than Mrs. E. The lobular arrangement is intact. The fatty degeneration appears as a narrow peripheral band in each lobule. The fat drops are very fine. Around each central vein is a zone of intact liver cells. As these are traced peripherally, they become more difficult to interpret and show patches of fatty stippling. Finally they merge into the peripheral band already referred to.	Shows well-marked diffuse fatty degeneration. The globules are fairly large and arranged as a rosette in many of the cells, around the centrally-lying nucleus.	There is diffuse fatty degeneration more definite at the periphery of the lobules. Around some of the central veins is an area which is devoid of fat. There is wide variation in the size of the fat globules. They tend to become smaller as the central vein is approached.	Presents a somewhat distinctive picture. There are two fatty zones. One is wide and well-marked, situated peripherally. The other, less distinct and narrow, clothes the central vein.
HEART ...	An exquisite example of myocardial degeneration. Every muscle fibre is crammed with fine fat droplets.	No fat found. Yellowish staining granules are seen at the nuclear poles.	Well-marked diffuse fatty degeneration. The muscle fibres are replete with fine fat droplets.	With the exception of yellow staining granules around the nuclear poles, no fatty granules are seen.	All the muscle fibres contain small fatty globules, <i>i.e.</i> a diffuse degenerative process.
KIDNEY ...	The bases of the cells are occupied by fatty globules of varying size. The endothelium of the glomerular tufts also shows slight fatty changes.	Faint traces of fat in the tubular epithelium.	Shows isolated tubules which have undergone fatty degeneration. No generalised fat change visible.	Very slight amount of fatty degeneration present.	The fatty globules are rather more numerous towards the bases of the tubular epithelial cells.

A NOTE ON THE CONDITION CALLED "BLACK TONGUE."

Dr. J. R. C. Stephens, Medical Officer, Ilorin, reported that there was a complaint prevalent among the natives of his district, called by themselves "black tongue," and that he thought it required investigation. Dr. E. C. Smith proceeded there on 1st October, 1926 and immediately began his investigations in the surrounding villages.

In all, twelve patients suffering from the condition were seen,

Six cases at Ifaki.

Three cases at Usi.

Two cases at Awtun.

One case at Ikun.

The cases at Awtun were watched from the day of development. At the onset, the tongue is found to be thickly coated with a white membranous-like layer, usually dry, but in some cases it may become slimy. Fragments of this membrane can be readily lifted away, leaving a smooth erythematous but non-haemorrhagic surface. The condition, apparently, does not cause any soreness in the tongue, but may bring about some slight distress in breathing, especially if it spreads to the soft palate.

The patients complain that it interferes with their sense of taste. They show their tongue to their friends who are usually found to be responsible for the diagnosis.

On or about the third day, the membranous formation commences to dry up and become discoloured, finally assuming a deep brown or black hue. This appearance is more particularly marked on the dorsum posteriorly, and on the sides of the organ.

At this stage the membrane may be very hard and dry, being separated with difficulty.

From the fifth day onwards, the condition shows signs of clearing up, the membrane breaking off and coming away in fragments.

It was noted that the formation of the membrane was accompanied by fever (100 to 103° F.) and by the presence of relapsing fever spirochaetes, in the patient's blood.

Scrapings from the affected tongues, made at various stages, revealed the presence of a large branching yeast-like fungus, probably of the "oidium" type. It was obtained in pure culture from four cases.

Conclusions—

- (1) Apparently the condition known among the natives as "black tongue" or, in the early stages, "white tongue," is due to the active proliferation of a fungus, probably of the oidium type, coincident with fever and the presence of the spirochaetes of relapsing fever in the patient's blood.
- (2) The lingual condition may persist during the apyretic periods between the relapses, that is at a time when no spirochaetes will be found in the blood and the temperature will be normal.
- (3) It would seem that the condition is worth bearing in mind as a possible indication of the presence of relapsing fever in a district.
- (4) It is the natives themselves who complain of the condition and who have given it its descriptive name.
- (5) It is possible that the condition may arise in other febrile diseases or in periods of ill-health, although no such evidence was obtained in the short space of time available.

LEPROSY.

The treatment of the inmates of the Yaba Leper Asylum was continued until the first week in October when they were handed over to the Medical Officer appointed to take charge.

Ethyl hydnicarpate which had been in use from October, 1925, was discontinued at the end of January. There was no obvious superiority in its action over that of moogrol and as the patients themselves preferred the latter drug, its intra-muscular administration was recommenced.

Thirteen patients received treatment at weekly intervals. All, with the exception of two cases, were old-standing, well-advanced cases that had been under treatment for years.

The following are the details :—

David—(mentioned in Reports of 1916, 1917, 1918, 1920, 1921 and 1924). Had twenty-four doses at weekly intervals, with a total of twelve weeks' rest. No active signs, nodules and thickenings have disappeared.

Lawani—(mentioned in Reports of 1916, 1917, 1918, 1920, 1921 and 1924). Tubercles fewer and less prominent, ulcerations tending to heal after eighteen doses at weekly intervals with eighteen periods of one week's rest.

Calabar—(mentioned in Reports of 1917, 1918, 1919, 1920, 1921, 1922 and 1924). Had twenty-four weekly doses with twelve periods of rest. The tubercles are less prominent, and broken skin has healed.

Brimah—(mentioned in Report of 1924). Has had twenty weekly doses with sixteen periods of rest. The acute progress of the disease has been arrested.

Idowu—(mentioned in Report of 1924). Has had twenty-two weekly doses with fourteen periods of rest. In this case, also, the acute process has been arrested.

Ogunbiye—(mentioned in Report of 1924). Has submitted to only nine doses. Active signs of the disease are in abeyance.

Oyekan—(mentioned in Report of 1924). Has had fourteen doses. An ulcer on the leg is the only outward sign of active disease.

Aina—(mentioned in Report of 1924). Has had sixteen doses. Condition is apparently stationary.

Patience—(mentioned in Report of 1924). Had only nine doses. Died of intercurrent disease in September.

Mowunmi.—A female aged about fifty-five years, admitted in the latter end of 1925, destitute, with signs of nerve leprosy, absorption of the bones of fingers and toes with " nibbling " of their extremities, and several maculae. Was given fourteen doses moogrol with twenty-two periods of rest. Absorption does not appear to have progressed, and the tips of the fingers and toes are cleaner.

Salami.—An old inhabitant of the Asylum who had persistently refused all treatment. He allowed himself to be persuaded in August and he received five doses.

Ojo.—An early case, had twenty-two doses with fourteen rests. The slight tuberculation on the face has distinctly lessened, and the tubercles on the ears have practically disappeared.

Abia.—Also an early case in a young male adult as in Ojo (above). There is a slight tuberculation on the cheeks and on the tips of the ears. The skin generally has the appearance of urticaria. He began treatment on 13th September, 1926, and has received three doses.

The experience of moogrol during the year has demonstrated again the suitability of that drug in the treatment of leprosy at Yaba. It is well tolerated by all and if taken over a sufficiently long period, and with regularity (once a week), it has a very definite remedial effect. Different individuals react differently, and a suitable dosage has to be found for each patient.

ENTOMOLOGY.

The work in this section was done by Mrs. Summers Connal.

Particular attention was devoted to the markings of the common household mosquito, *Aedes argenteus* which used to be better known under its old title of *Stegomyia fasciata*.

Great variation was found to exist and the findings have been summarised for this report.

Specimens of biting insects were gratefully received from the following:—

Dr. Allan, Major Bell, Dr. Crawford, Dr. Dyce-Sharp, Dr. Fraser, Dr. Orpen, Dr. Pasqual, Mr. Pretious, Dr. Smith, Dr. Stephens, Mr. Till, Dr. Waller and Mr. G. Wilson.

ON THE NUMEROUS VARIATIONS OCCURRING IN THE SPECIMENS OF *Aedes argenteus*, POIRET OBTAINED IN LAGOS, NIGERIA.

During the last few years there has been a considerable increase in the number of new varieties of mosquitos created. This has made the path difficult for the Entomologist working abroad and has rendered things perplexing to Medical Officers in general.

On reading over again the description of *Stegomyia fasciata* var. *atritarsis* Edwards ⁽¹⁾ it appeared that it would be interesting to examine a number of freshly hatched and therefore undamaged specimens of *Aedes argenteus*, and to note how many conformed to the original description.

No difficulty was experienced in obtaining the necessary material, as collections of larvae are received daily from the Medical Officer of Health in Lagos.

One thousand males and one thousand females of the species were mounted in the order of their emergence from the pupal case, and were examined under the binocular microscope.

The one really constant feature was found to be the lyre on the thorax, although even there the outline and the centre lines varied in breadth and in colour, and the centre lines also varied in length.

But as the abdomen and the hind legs showed the greatest variations, the present paper is restricted to a description of these.

There were specimens with the abdomen all black, except for the lateral spots. Again there were many which had the abdomen covered with pure white scales. In others, white or yellow scales were scattered all over the abdomen so as to give a brindled appearance. Some examples had both apical and basal bands and others had only basal bands.

The depth of the bands varied within wide limits. Many of the basally-banded had a narrow band of perhaps two or three rows of scales on the second and third segments which increased to five rows on the fourth and fifth segments. Some had deep bands on every segment, others had narrow ones of only one row of scales.

The first segment of the abdomen was all black in some cases, and all white or all yellow in others.

In some individuals there was a triangular median spot on the first abdominal segment, the colour of which was white or yellow. The lateral spots varied in size and occasionally they were purple in colour.

The seventh segment usually had one row of yellow apical scales, but sometimes this whole segment was covered with white or yellow scales, and in a number of instances the coloured scales formed a triangular patch. There was variation in colour both of the groundwork and of the ornamentation. Both white bands and yellow bands were met with. The groundwork was not always black, and light brown shades occurred.

As regards the hind tarsus, there were numerous variations. In a large number the last segment was typically all white. In others the tip was black, in others again the terminal half or the terminal quarter was black. Several specimens thought to be the variety *atritarsis* of Edwards had the typical white band on the last segment reduced to a mere spot. The white band on the fourth segment of the hind tarsus varied in breadth not only in relation to its own segment but also in relation to the bands on the other segments. In fact the length of the fourth segment itself varied, for in some cases it was extremely short, being just a little longer than the fifth segment whilst in other specimens it was almost twice as long. The breadth of the white band on the fourth segment varied between two extremes, on the one hand leaving only the tip black and on the other being reduced to a white basal spot. In some instances the white band was a quarter, in others a half and in some three-quarters of the length of the fourth segment. It was often difficult to say whether or not the segment was all white, not only in those cases in which it was short but also in the cases in which it was long, in relation to the other segments.

The breadth of the band on segments one, two, three and four varied in relation to each other. Typically, according to description, the single bands on each of the first four segments of the hind tarsus are equal in breadth. Two variations, however, excluding variety *atritarsis*, occur quite commonly. In one, the breadth of the band on the fourth segment is double that of each of the first, second and third segments. In the other, the band on segment four equals that on segment one, but each is double the width of the band on segment two and segment three.

The colour of these bands was almost constantly white, but in one or two cases it was yellow.

The groundwork of the hind legs was often brown instead of black.

Female Specimens.—In the thousand females there were 689 (*i.e.*, 68.9 *per cent.*) with typically basally banded abdominal segments. Of these, 390 had the last segment of the hind tarsus typically white. The remaining 299 had the last segment of the hind tarsus with a black tip, or the terminal quarter, or terminal half, black, and in some almost the whole segment (variety *atritarsis*) was black. Therefore, the percentage of typically basally banded females, equalling 68.9 *per cent.*, showed typical markings on the last segment of the hind tarsus in 56.45 *per cent.*

Specimens with a "brindled" abdomen came next in numerical order. These had usually apical as well as basal bands with a broad median longitudinal band uniting them, the remainder of each segment being dotted with white or yellow scales. The "brindled" numbered 127 and in eighty-one the last segment of the hind tarsus was white. In forty-six the last segment of the hind tarsus showed the variations described in the first group.

Individuals with both apical and basal bands were 110 in number. These showed no white or yellow scales elsewhere on the abdominal segments. In sixty-seven the last segment of the hind tarsus was all white and in the remaining forty-three it was not all white. The width of the abdominal bands in this third group varied greatly. In some the apical band consisted of only one row, in others there were three or four rows in the band. In some instances, both the apical and the basal bands were so broad that only a narrow black strip was left between them. It was seldom that the basal and apical bands were equal in breadth.

The most interesting and beautiful group consisted of those which had the abdomen covered with white scales. Occasionally a specimen showed a few black scales amongst the white, and including these there were forty in the "white abdomen" group. Of these, twenty-six had the last hind tarsus segment all white and in fourteen it was not white. There were no examples of variety atritarsis in this group but in several the terminal half, and in others the terminal quarter, was black.

The fifth group contains the specimens which had the abdomen all black. There was no question of the bands having been rubbed off. Each specimen was perfect and intact. The scales were all black or purplish black. With the light at a certain angle it was sometimes possible to trace a purple basal band on the black background. The lateral spots on these specimens were usually white, but in one or two cases they were purplish black. They numbered twenty-five, and seventeen had the last hind tarsal segment white. In the remaining eight some had the last segment half black, but there was no example of variety atritarsis amongst them.

The smallest and last group was made up of nine individuals with only apical bands on the abdominal segments. The banding was narrow, with usually only one row of white or yellow scales in each. Two of these had the last hind tarsal segment white. The other seven nearly all had the terminal half black.

Table VII condenses the information.

TABLE VII.

Basally banded	...	...	689	Last segment, hind tarsus white	390.
Brindled	...	...	127	"	81.
Apically & Basally banded	...	...	110	"	67.
White abdomen	...	...	40	"	26.
Black abdomen	...	...	25	"	17.
Apically banded	...	...	9	"	2.
<hr/> 1,000 <hr/>				<hr/> 583. <hr/>	

Male Specimens.—The largest group consists, as it does in the females, of those with a basally banded abdomen. They numbered 852, a much larger proportion than was found in the females. Of this number, 477 had the last hind tarsal segment white.

The second largest group is formed by the apically and basally banded abdomen, thus differing from the females, whose second group consisted of the "brindled" abdomen. There were seventy-four in this second group, and of these there were forty-nine which had the last segment of the hind tarsus white.

The third group comprises the "brindled" specimens, of which there were forty-six and amongst these there were twenty-five with a white last hind tarsal segment.

Specimens with a white abdomen form, as they do in the case of the females, the fourth group. They numbered only twenty-one and they included fifteen with the last hind tarsal segment white.

The black abdomen group was made up of seven individuals, four of which had the last segment of the hind tarsus white.

The fifth group, the apically banded was unrepresented in the males. Table VIII gives the figures.

TABLE VIII.

Basally banded	852.	Last segment hind tarsus white	477.
Apically and basally banded	74.	" " " "	49.
Brindled	46.	" " " "	25.
White abdomen	21.	" " " "	15.
Black abdomen	7.	" " " "	4.
	<u>1,000</u>		<u>570</u>

It will be seen that in the females the typically marked abdomen was found in 68.9 *per cent.* The typical last hind tarsal segment occurred in 58.3 *per cent.* A typical abdomen and last hind tarsal segment, however, was present in only thirty-nine *per cent.*

The following figures show the frequency of typical markings on the last hind tarsal segment in the several atypically ornamented abdomens:—

Basally banded	56.60 <i>per cent.</i>
Brindled	63.70 "
Apically and basally banded ...	69.90 "
White abdomen	65 "
Black abdomen	68 "
Apically banded	56.60 "

As regards the males, 85.2 *per cent.* showed a typically marked abdomen, and fifty-seven *per cent.* showed a typical last hind tarsal segment. A typical abdomen and last hind tarsal segment were found in 47.7 *per cent.*

The percentage of typical marking on the last hind tarsal segment in the different groups of atypically marked abdomen is shown below:—

Basally banded	55.98 <i>per cent.</i>
Apically and basally banded ...	66.21 "
Brindled	54.34 "
White abdomen	71.42 "
Black abdomen	57.01 "

Markings on the hind tarsus.—There were three distinct groups in the markings on the hind tarsus. (The last hind tarsal segment was considered separately). The most frequent markings were the band on the second and third segments equal in breadth, and the band on the first and fourth segments also equal but each of them double the breadth of that on the second and third segments. In this group there were 519 females and 529 males. (Group 1).

In the second group, that in which the bands were all of the same breadth, on the four segments, there were 236 females and 417 males. (Group 2.)

In the third group, the bands of the first, second and third segments were all equal but that on the fourth segment was double the breadth of each. In 238 females and forty-seven males this arrangement was present. (Group 3.) The markings of variety atritarsis were noted in seven females and seven males.

BREEDING EXPERIMENTS.

Several breeding experiments were undertaken, the details of which are given below.

Experiment (1)—Female with “white” abdomen.

Male with narrow basal bands.

The last hind tarsal segment in both was all white.

The banding of the first, second, third and fourth segments of the hind tarsus conformed to Group 1 in the female, and Group 2 in the male.

Sixteen adults were obtained: ten females and six males.

In the females—

The abdomen was basally banded in five.

The abdomen was brindled in three.

The abdomen was apically banded in one.

The abdomen was white in one.

In the males—

The abdomen was basally banded in two.

The abdomen was brindled in two.

The abdomen was apically banded in one.

The abdomen was white in one.

Thus the abdominal markings of the father were reproduced in seven of the progeny, those of the mother in two, and seven showed the marking of neither parent.

The last hind tarsal segment had a black tip in 3♂, 1♀, was all white in 3♂, 8♀ and was half black in one female.

In the females the hind tarsal markings belonged to Group 1 in seven cases, to Group 2 in three cases.

In the males the hind tarsal markings belonged to Group 1 in two cases, to Group 2 in four cases.

They were thus rather evenly divided, nine favouring the mother and seven the father.

Experiment (2)—Female with white abdomen.

Male apically and basally banded.

Last segment hind tarsus, female all white.

Last segment hind tarsus, male with black tip.

The banding on the hind tarsal segments in both belonged to Group 2.

Six adults hatched out, five males and one female.

In the males—

The abdomen was apically and basally banded in three.

The abdomen was white in one.

The abdomen was brindled in one.

In the single female the abdomen was apically and basally banded.

In the males, three had the last hind tarsal segment all white and two had a black tip. In the female also there was a black tip.

In the males the hind tarsal segments fell into Group 2 in three cases, and into Group 1 in two cases.

In the female the bands were all equal (Group 2).

Experiment (3)—Female with white abdomen.

Male with broad white basal bands.

In the female, the last hind tarsal segment was black-tipped.

In the male, the terminal half was black.

In the female, the hind tarsal segments fell into Group 2.

In the male they came into Group 1.

Thirteen adults hatched out, eight males and five females.

In the males—

The abdomen was apically and basally banded in four.

The abdomen was basally banded in two.

The abdomen was brindled in one. And in the last there were a few white apical scales on each segment, in addition to the basal banding. The basally banded specimens had the bands very narrow. All the bands were white. In the females, all had both apical and basal bands but in three, the colour of the bands was yellow, not white.

In the males the last hind tarsal segment was black-tipped in six, was all white in one, and in the last, the terminal half was black.

In the females there was a black tip in three and the terminal quarter in two cases was black.

In the males the hind tarsal segments fell into Group 2 in seven cases, and into Group 1 in one case.

In the females all came into Group 2.

Experiment (4)—Female with white abdomen.

Male brindled.

In the female, terminal half, last hind tarsal segment black.

In the male, merely the tip was black.

In the female, the hind tarsal segments came into Group 1.

In the male, they came into Group 2.

Two adults hatched out, both females. One had broad basal bands, and the other had a white abdomen. The last hind tarsal segment in both was black-tipped. The hind tarsal segments fell into Group 2 in both cases.

Experiment (5)—The parents in this experiment were both hatched out from Experiment (1).

The female had narrow basal bands on the abdomen.

The male abdomen was white.

The last hind tarsal segment in the female was all white.

In the male it had a black tip.

The hind tarsal segments in both parents came under Group 1.

Seven adults were obtained, four males and three females.

In the males—

The abdomen was apically and basally banded in three.

The abdomen was white in one.

In the females—

The abdomen had narrow basal bands in two.

The abdomen was brindled in one.

The last hind tarsal segment, in the males, had the terminal half black in two cases, in one the tip was black and in the other the segment was all white.

In the females, all three had the last hind tarsal segment all white. The banding of the hind tarsal segments in the males, came into Group 2 in three cases and in the fourth it was in Group 1.

In the females, two came into Group 2 and one into Group 1.

Experiment (6)—Here also, the parents hatched out in Experiment (1).

Both parents had narrow basal bands on the abdomen.

Both also had the last segment of the hind tarsus white.

In the female, the banding of the hind tarsus came into Group 2. In the male, it came into Group 1.

Three adults hatched out, two males and one female. All had narrow basal abdominal bands. One male had the last hind tarsal segment with the terminal half black and the other had only the tip black.

In the female, the last hind tarsal segment was all white.

In the males the markings on the hind tarsus came under Group 1, and in the female under Group 2.

Experiment (7)—The parents again came from Experiment (1).

Both had a brindled abdomen.

The female had the last hind tarsal segment all white.

The male had the tip black.

The hind tarsus of the female came into Group 1.

That of the male came into Group 2.

Only one adult was obtained, a female. The abdomen was basally banded, the bands being narrow. The tip of the last hind tarsal segment was black, and the banding of the hind tarsus brought it into Group 2.

Several attempts were made to get adults of the next generation, but the females invariably died before eggs were laid.

Although it seemed fairly certain that light and shade, and different colours of the breeding-dishes were not the reason of the variations in the markings, several experiments were carried out with this possibility in view.

A pure white, an unrelieved black and a reddish brown environment were tried.

The white breeding-dishes yielded no more insects with abundant white ornamentation than did the black, nor did the black dishes contain more darkly marked specimens than the white. The reddish brown dishes had no obvious influence on the markings.

SUMMARY AND CONCLUSIONS.

The markings of *Aedes argenteus*, Poiret, are dealt with.

Attention is directed to the abdominal markings and to the markings on the last hind tarsus.

One thousand males and one thousand females of the species were examined.

There was no selection, the insects being taken as they hatched from the pupa in collections sent daily by the Medical Officer of Health, Lagos. As regards the abdomen, the following groups were encountered, among the females:—

- (1) Basally banded.
- (2) Brindled.
- (3) Apically and basally banded.
- (4) All white.
- (5) All black.
- (6) Apically banded.

In the males no specimen of the apically banded was met with.

These variations were found to be unconnected with the colour of the breeding dish, in so far as black, white and reddish-brown surroundings are concerned.

Nor were the markings found to vary with age or feeding. The same markings were found on insects newly hatched as on those kept alive for a day or two and given a meal on blood or on fruit juice.

The last hind tarsal segment may have a black tip, or the terminal quarter or half may be black, or as in variety atritarsis there may be a mere white basal spot.

The white bands on the first four segments of the hind tarsus fall into three groups:—

- (1) The bands are equal in breadth.
- (2) The band on the fourth segment is double the breadth of each of those on the other segments.
- (3) The band on the fourth segment is equal in breadth to that on the first, and each is double the breadth of those on the second and third segments.

There appeared to be no justification for describing a new variety from any of the specimens which were examined.

The findings recorded above are given in the hope that they will tend to discourage the creation of new varieties.

(1) Reference, Edwards, F. W. Bull. Ent. Res. Vol. X, 1919-1920, page 129.

MOSQUITO LARVAE FROM THE LAGOS MUNICIPAL AREA.

Owing to the absence of the Honorary Entomologist, no identifications of mosquito larvae were recorded in the period March to July or in parts of February and August.

There were 1,389 collections of larvae sent for identification, from twenty-six different receptacles or sources, and containing nine different species, in the period January-February, and September-December.

The species were :—

<i>Aedes argenteus</i>	...	in 697 collections.
<i>Culex nebulosa</i>	...	„ 634 „
<i>Culex fatigans</i>...	...	„ 58 „
<i>Anopheles gambiae</i>	...	„ 14 „
<i>Culex decens</i> ...	...	„ 7 „
<i>Culex thalassius</i>	...	„ 5 „
<i>Aedes luteocephalus</i>	...	„ 4 „
<i>Culex duttoni</i>...	...	„ 3 „
<i>Eretmopodites chrysogaster</i>	„	1 collection.

Two or more species occurred in the same collection as follows :—

Barrel.	<i>Aedes argenteus</i> and <i>Culex fatigans</i>	...	...	in 1 collection.
Canoe.	<i>Culex nebulosa</i> and <i>Culex thalassius</i>	...	...	„ 1 „
Catchpit.	<i>A. argenteus</i> and <i>C. nebulosa</i>	...	...	„ 2 collections.
	<i>C. fatigans</i> and <i>C. nebulosa</i>	...	...	„ 1 collection.
Cooler.	<i>C. nebulosa</i> , <i>A. argenteus</i> and <i>C. fatigans</i>	...	...	„ 1 „
Drum.	<i>A. argenteus</i> and <i>C. nebulosa</i>	...	...	„ 1 „
Mortar.	„ „ „ „ „ „	...	...	„ 1 „
Pool.	<i>C. fatigans</i> and <i>Anopheles gambiae</i>	...	...	„ 1 „
Pot.	<i>A. argenteus</i> and <i>C. nebulosa</i>	...	...	„ 9 collections.
	„ „ „ „ <i>fatigans</i>	...	...	„ 4 „
	„ „ „ „ <i>A. luteocephalus</i>	...	...	„ 2 „
	<i>C. nebulosa</i> and <i>C. fatigans</i>	...	...	„ 2 „
	<i>A. gambiae</i> and „ „	...	...	„ 1 collection.
Tin.	<i>C. duttoni</i> and <i>C. decens</i>	...	...	„ 1 „
	<i>A. argenteus</i> and <i>C. nebulosa</i>	...	...	„ 1 „
	„ „ „ „ <i>A. luteocephalus</i>	...	...	„ 1 „
	<i>C. fatigans</i> and <i>C. decens</i>	...	...	„ 1 „
Tyre	<i>Eretmopodites chrysogaster</i> , <i>C. fatigans</i> and <i>A. argenteus</i>	...	...	„ 1 „
	<i>A. argenteus</i> and <i>C. nebulosa</i>	...	...	„ 1 „
	<i>C. fatigans</i> „ „ „	...	...	„ 1 „

The combinations of two larvae are :—

<i>Aedes argenteus</i> and <i>Culex nebulosa</i>	...	...	...	in 15 cases.
„ „ „ „ <i>fatigans</i>	...	...	...	„ 5 „
„ „ „ „ <i>Aedes luteocephalus</i>	...	...	...	„ 3 „
<i>Culex nebulosa</i> „ „ <i>Culex fatigans</i>	...	...	...	„ 4 „
<i>Anopheles gambiae</i> and <i>Culex fatigans</i>	...	...	...	„ 2 „
<i>Culex decens</i> and <i>Culex fatigans</i>	...	...	...	„ 1 case.
„ „ „ „ <i>duttoni</i>	...	...	...	„ 1 „
„ <i>nebulosa</i> and <i>Culex thalassius</i>	...	...	...	„ 1 „

The combinations of three larvae are :—

<i>Culex nebulosa</i> , <i>Culex fatigans</i> and <i>Aedes argenteus</i>	...	in 1 case.
<i>Eretmopodites chrysogaster</i> , <i>C. fatigans</i> and <i>A. argenteus</i>	„ 1 „	

The sources or receptacles were twenty-six in number, namely :—

Barrel, bottle, bucket, calabash, canoe, catch-pit, cooler, drain, drum, dye-pot, flower-pot, grinding stone, jug, kettle, mortar, pail, pan, pit, pool, pot, tannery pit, tank, tin, tree-hole, tyre and well.

The sources or receptacles in their order of attraction were :—

Pot	...	...	855 collections.
Catchpit	...	...	134 „
Tin	...	...	102 „
Drum	...	...	57 „
Barrel	...	...	44 „
Bucket	...	...	28 „
Drain	...	...	25 „
Bottle	...	...	21 „
Well	...	...	19 „
Pool	...	...	17 „
Jug	...	...	13 „
Kettle	...	...	10 „
Pan	...	...	9 „
Tyre	...	...	9 „
Tank	...	...	8 „
Cooler	...	...	7 „
Canoe	...	...	7 „
Pail	...	...	6 „
Mortar	...	...	4 „
Pit	...	...	3 „
Tree-hole	...	...	3 „
Calabash	...	...	2 „
Tannery pit	...	...	2 „
Flower pot	...	...	2 „
Dye pot	...	...	1 collection.
Grindstone	...	...	1 „

The full data are given in Table IX.

TABLE IX.

Source.	Larvae.	Jan.	Feb.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.
<i>Barrel.</i>	<i>Culex fatigans</i>	2	...	...	...	1	...	1	4
	<i>Culex nebulosa</i>	3	...	...	1	3	4	6	17
	<i>Aedes argenteus</i>	1	1	...	3	7	4	6	22
	<i>A. argenteus, C. fatigans</i> ...	...	...	...	...	1	...	...	1
<i>Bottle.</i>	<i>Culex nebulosa</i>	2	...	...	...	2	3	...	7
	<i>Aedes argenteus</i>	3	1	...	1	3	4	2	14
<i>Bucket.</i>	<i>Aedes argenteus</i>	6	3	1	3	6	3	1	23
	<i>Culex nebulosa</i> ... ..	...	3	...	1	1	...	...	5
<i>Calash.</i>	<i>Culex nebulosa</i>	1	...	...	...	1	...	...	2
<i>Canoe.</i>	<i>Culex nebulosa</i> ... ..	...	...	...	...	...	1	...	1
	<i>Anopheles gambiae</i> ... ..	...	...	...	...	...	1	...	1
	<i>Culex thalassius</i> ... ..	...	...	...	...	...	...	3	3
	<i>Aedes argenteus</i> ... ..	...	...	...	...	...	...	1	1
	<i>C. nebulosa, C. thalassius</i>	...	...	...	1	...	...	...	1
<i>Catchpit.</i>	<i>Culex fatigans</i>	5	1	...	8	2	1	2	19
	<i>Aedes argenteus</i>	6	1	1	3	4	1	7	23
	<i>Culex nebulosa</i>	40	12	1	5	18	2	11	89
	<i>A. argenteus, C. nebulosa</i>	1	...	1	...	...	...	...	2
	<i>C. nebulosa, C. fatigans</i> ...	...	...	...	1	...	...	...	1
<i>Cooler.</i>	<i>Aedes argenteus</i>	1	...	...	2	1	...	...	4
	<i>Culex nebulosa</i>	2	...	...	...	...	...	...	2
	<i>C. nebulosa, A. argenteus</i> & <i>C. fatigans</i> ... ..	...	...	...	...	1	...	...	1
<i>Drain.</i>	<i>Culex nebulosa</i>	9	3	1	1	1	1	3	19
	<i>Culex fatigans</i>	1	...	...	3	...	...	...	2
	<i>Aedes argenteus</i>	1	...	...	1	...	...	...	2
	<i>Anopheles gambiae</i> ... ..	...	...	...	1	1	...	...	1
	<i>Culex decens</i> ... ..	...	...	...	...	...	...	1	1
<i>Drum.</i>	<i>Aedes argenteus</i>	7	1	1	4	5	3	10	31
	<i>Culex nebulosa</i>	7	2	1	5	3	...	4	22
	<i>Culex decens</i> ... ..	...	1	...	...	...	...	...	1
	<i>Culex duttoni</i> ... ..	...	...	...	...	1	...	...	1
	<i>Culex fatigans</i> ... ..	...	...	...	...	1	...	...	1
	<i>A. argenteus, C. nebulosa</i>	...	...	...	...	...	...	1	1
<i>Dye-pot.</i>	<i>Aedes argenteus</i> ... ..	...	...	...	1	...	...	...	1
<i>Flower pot.</i>	<i>Aedes argenteus</i> ... ..	...	...	...	1	...	...	1	2
<i>Grind- stone.</i>	<i>Aedes argenteus</i> ... ..	...	...	...	...	1	...	...	1
<i>Jug.</i>	<i>Culex nebulosa</i>	4	1	...	...	1	2	...	8
	<i>Aedes argenteus</i>	2	...	...	...	1	1	...	4
	<i>Culex fatigans</i> ... ..	...	1	...	...	...	...	...	1
<i>Kettle.</i>	<i>Aedes argenteus</i>	4	2	...	...	...	...	1	7
	<i>Culex nebulosa</i>	2	...	...	...	...	1	...	3
<i>Mortar.</i>	<i>Aedes argenteus</i>	1	...	...	...	1	...	...	2
	<i>Culex nebulosa</i> ... ..	...	1	...	...	...	...	1	2
	<i>C. nebulosa, A. argenteus</i>	...	...	...	...	1	...	...	1
<i>Pail.</i>	<i>Aedes argenteus</i> ... ..	...	...	...	...	2	1	...	3
	<i>Culex fatigans</i> ... ..	...	...	...	...	...	...	1	1
	<i>Culex nebulosa</i> ... ..	...	...	...	...	...	...	2	2
<i>Pan.</i>	<i>Culex decens</i>	1	...	...	...	...	...	...	1
	<i>Aedes argenteus</i> ... ..	...	...	1	2	1	3	1	8
<i>Pit.</i>	<i>Culex nebulosa</i> ... ..	...	...	...	...	...	1	...	1
	<i>Aedes argenteus</i> ... ..	...	...	...	...	...	1	...	1
	<i>Culex fatigans</i> ... ..	...	...	...	...	...	...	1	1

TABLE IX.—*continued.*

Source.	Larvae.	Jan.	Feb.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
<i>Pool.</i>	<i>Culex fatigans</i> ... ..	...	...	...	3	2	...	...	5
	<i>Anopheles gambiae</i> ... ..	...	...	...	3	...	1	1	5
	<i>Aedes argenteus</i> ... ..	...	...	...	1	2	1	...	4
	<i>Culex nebulosa</i> ... ..	...	...	...	...	1	1	...	2
	<i>A. gambiae, C. fatigans</i> ...	...	...	...	...	1	...	...	1
<i>Pot.</i>	<i>Aedes argenteus</i>	34	23	5	70	122	71	111	436
	<i>Culex nebulosa</i>	139	33	4	46	52	49	65	388
	.. <i>fatigans</i>	2	...	...	5	...	...	...	7
	.. <i>decens</i>	1	...	...	...	...	...	...	1
	.. <i>duttoni</i> ... ..	...	...	...	...	...	...	1	1
	<i>Anopheles gambiae</i> ... ..	...	...	...	...	1	2	...	3
	<i>A. argenteus, A. luteocephalus</i>	...	...	1	1	...	...	...	2
	<i>A. argenteus, C. nebulosa</i>	...	...	1	2	4	...	2	9
	<i>A. argenteus, C. fatigans</i>	...	...	...	2	1	1	...	4
	<i>C. duttoni, C. decens</i> ...	...	...	...	1	...	...	...	1
	<i>C. fatigans, C. nebulosa</i> ...	...	...	...	...	...	1	1	2
	<i>C. .. An. gambiae</i> ... ..	...	...	1	...	...	...	...	1
<i>Tannery pit.</i>	<i>C. fatigans</i> ... ..	...	...	...	...	1	...	...	1
	<i>Aedes argenteus</i> ... ..	...	...	...	...	1	...	...	1
<i>Tank.</i>	<i>Culex thalassius</i>	1	...	...	...	...	...	...	1
	<i>Anopheles gambiae</i> ... ..	...	...	...	1	...	...	...	1
	<i>Culex nebulosa</i> ... ..	...	...	...	...	...	1	1	2
	<i>Aedes argenteus</i> ... ..	...	...	...	...	...	2	2	4
<i>Tin.</i>	<i>Aedes argenteus</i>	17	5	4	4	12	8	6	56
	<i>Culex nebulosa</i>	17	3	3	1	7	4	4	39
	<i>Culex fatigans</i>	1	...	...	...	1	...	...	2
	<i>Anopheles gambiae</i> ... ..	...	...	...	...	1	...	...	1
	<i>A. argenteus, C. nebulosa</i>	...	...	1	...	...	...	...	1
	<i>A. argenteus, A. luteocephalus</i>	...	...	...	...	...	1	...	1
	<i>C. fatigans, C. decens</i> ...	1	...	...	...	...	...	...	1
	<i>C. fatigans, A. argenteus and Eretmopodites chrysogaster</i>	..	...	...	...	1	...	...	1
<i>Tyre.</i>	<i>Aedes argenteus</i> ... ..	...	...	2	1	2	...	...	5
	<i>Culex nebulosa</i>	1	...	...	...	...	...	1	2
	<i>A. argenteus, C. nebulosa</i>	...	...	1	...	...	...	...	1
	<i>C. nebulosa, C. fatigans</i> ...	...	...	...	...	1	...	...	1
<i>Tree-hole.</i>	<i>Aedes luteocephalus</i> ... ..	...	...	...	1	...	...	...	1
	<i>Culex nebulosa</i> ... ..	...	...	...	...	1	...	...	1
	<i>Aedes argenteus</i> ... ..	...	...	...	...	...	...	1	1
<i>Well.</i>	<i>Aedes argenteus</i>	4	...	2	1	2	2	1	12
	<i>Culex decens</i>	1	...	...	...	...	..	1	2
	<i>Culex nebulosa</i>	2	1	...	...	1	1	...	5
	Tatals	333	99	33	188	288	184	264	1,389

In the absence of data for the months between February and August it would be unwise to institute comparisons, but the large number of collections received in January and December, these being almost rainless months, would seem to indicate that, in the absence of other breeding-places the mosquito sought the ubiquitous water pot of the usual native household. This utensil harboured every species identified with the exception of *Eretmopodites chrysogaster* which is to be regarded as a "bush" mosquito. As a palliative or accessory measure the indications are that sanitary efforts concentrated on the water-pot, which the introduction of a pipe-borne supply does not seem to have reduced materially in numbers, would be very usefully directed, during the dry season, in reducing the number of household mosquitos.

BLOOD-SUCKING INSECTS SENT FOR IDENTIFICATION.

From Kano—

Cimex lectularius and *C. rotundatus*, about 150 of each.

From Onitsha—

Taeniorhynchus (*Mansonioides*) *africanus*, 86 ♀ ♀.
Culex invidiosus, 1 ♀.

From Mamfe—

<i>Chrysops silacea</i>	...	...	...	...	18 ♀ ♀.
<i>Glossina palpalis</i>	...	...	...	...	26 ♀ ♀.
,, <i>pallicera</i>	...	...	...	..	4 ♀ ♀.
,, <i>tabaniformis</i>	...	...	...	...	1 ♀.
<i>Tabanus kingsleyi</i>	...	...	...	...	8 ♀.
<i>Simulium damnosum</i>	...	...	...	...	182 ♀ ♀.
<i>Culicoides</i> sp.	...	...	...	...	numerous.

(All the above insects were dissected, and larval filariae similar to those described by Blacklock, were found in five specimens of *Simulium damnosum*, the parasites being present in the thorax only, in two, in both head and thorax in two and in the proboscis only in one).

From Makurdi—

<i>Anopheles gambiæ</i>	...	...	...	12 ♂ ♂,	12 ♀ ♀.
<i>Culex univittatus</i>	...	...	...	4 ♂ ♂,	7 ♀ ♀.
<i>Lutzia tigripes</i>	...	...	...	4 ♀ ♀.	
<i>Anopheles squamosus</i>	...	...	...	2 ♂ ♂,	1 ♀.
,, <i>maculipalpis</i>	...	...	...	3 ♂ ♂,	3 ♀ ♀.
<i>Aedes argenteus</i>	...	...	...	1 ♀.	

From Lagos—

<i>Aedes irritans</i>	...	...	...	3 ♂,	13 ♀ ♀.
,, <i>nigricephalus</i>	...	...	...	2 ♀ ♀.	
,, <i>argenteus</i>	...	...	...	3 ♀ ♀.	
<i>Culex thalassius</i>	...	...	...	5 ♀ ♀.	
,, <i>insignis</i>	...	...	...	3 ♀ ♀.	
,, <i>fatigans</i>	...	...	...	1 ♀.	
,, (<i>culiciomyia</i>) <i>nebulosa</i>	...	...	...	3 ♀ ♀.	
<i>Glossina palpalis</i>	...	...	...	1 ♀.	
<i>Tabanus secedens</i>	...	...	...	2 ♀ ♀.	

Note on the ova of Aedes argenteus—

Some eggs, dried on filter paper, of *Aedes argenteus* were taken to England on 12th February, 1926, and were brought back again to Lagos on 18th August, 1926. They were placed in water on 14th September, 1926, and on 19th September, 1926 many larvae hatched out and three adults emerged.

A note on cross-breeding experiments—

Aedes argenteus, female, and *Culex thalassius*, male, negative.

Aedes argenteus, female, and *Aedes luteocephalus*, male, eggs laid but did not hatch.

Aedes argenteus, female, and *Culex fatigans*, male, eggs laid but did not hatch.

DISSECTIONS.

Taeniorhynchus africanus,
sixty dissected one showed numerous amoebae in
stomach contents, others negative.

Aedes domesticus, fourteen
dissected two showed peculiar cysts in
stomach contents, others negative.

Anopheles umbrosus, four
dissected two with filaria larvae in thorax,
others negative.

Culex duttoni, three dis-
sected all negative.

Anopheles gambiae, three
dissected one with filaria larvae in thorax,
other two negative.

Culex nebulosa, two dis-
sected both negative.

Aedes nigricephalus, two dis-
sected both negative.

Lutzia tigripes and
Culex thalassius
one of each dissected ... both negative.

APPENDIX B.

ANNUAL REPORT ON THE AFRICAN HOSPITAL
LABORATORY, LAGOS, 1926.

BY

G. G. BUTLER, B.A., M.D., B.C., (CANTAB.) M.R.C.S., L.R.C.P.

REPORT ON THE AFRICAN HOSPITAL LABORATORY.

This report covers the period of 1926 with the additional period of the last two months of 1925 in order to make the report complete from the date when my appointment as a whole-time Pathologist to the Hospital took effect.

Perhaps, in view of the fact that the appointment is now separated from the Medical Research Institute at Yaba, I should mention certain details.

The Laboratory has arisen by closing-in with galvanised iron the open space below a ward built on iron pillars and measures about 30 feet square. By having the ceiling boarded and the floor space divided up by partitions it has been possible to arrange a cleaning room for apparatus, a space for sterilizers and other electric equipment and generally to make the room fairly comfortable to work in. Unfortunately the lighting is very bad and the general dustiness is a trial.

Plans have been drawn up for a new laboratory when the Hospital is rebuilt and I fancy I have allowed sufficient room for expansion for some time to come and to allow room for a museum.

Staff.—Besides myself two native laboratory attendants have been employed during the major part of the time; both resigned during the latter part of the year, the more able one through the fears of his family that he was unnecessarily exposed to plague and the other because he anticipated my opinion that he was unlikely to reach the standard I expected. There has been great difficulty in finding suitable candidates for the post of laboratory attendant; one of the main factors I believe was due to the counter attraction of dispenser which leads to better prospects and possible private practice but this I fancy has been rectified now. The standard of education of the available youths is very much below what should be required in a laboratory; those who have applied for the appointment having no knowledge of the metric system, the barest glimmering of what the percentage strength of a solution means and whose general knowledge of his surroundings is so limited that he is unaware of what creatures lay eggs beside the hen.

It is out of material such as this that the future laboratory attendant apparently has to be made, necessitating considerable time and patience and becomes a rather difficult and almost impossible matter in a single-handed laboratory. I am convinced that without some such basic knowledge, no really satisfactory laboratory attendant can be evolved and it seems reasonable to expect that candidates should have this knowledge before they apply for the post.

Equipment.—By degrees this has arrived and the laboratory is sufficiently well equipped to carry out most of the requirements from the wards. An electric ice safe was acquired locally and made the keeping of sera possible and much saving in the deterioration of rubber gloves, etc. Sufficient equipment is available for the making of media but it has been found quite impossible to undertake it with a staff whose knowledge of making up solutions is deficient and I have to thank the Director of the Medical Research Institute for his valuable help in keeping me supplied with such requirements. Unfortunately a water bath for Wasserman and Sachs-Georgi reactions was not available until quite recently and has curtailed that branch of my work.

A freezing microtome will shortly arrive and facilitate matters considerably, particularly in the examination of fatty changes in tissues, so important in aiding the elucidation of certain causes of death.

Scope of Work.—It has been my endeavour to meet every requirement or test that has been suggested by those in charge of the Hospital in the same way as is expected from the laboratories of a large hospital at home; this involves the routine examination and bacteriology of the blood and the various excretions and secretions from both the in- and out-patients departments of the European and African Hospitals. Similarly, the requests of private practitioners are met gratis but there is not a big demand from the qualified native medical man. The fact that treatment in the tropics is frequently based or controlled by these examinations means that there should be the minimum of delay with the maximum of accuracy, a standard difficult of attainment without an adequate staff.

The clinching of diagnoses in the post-mortem room has been no small feature of the activities of the Laboratory and leads to the investigation of various selected tissues in order to confirm the findings or aid in the elucidation of the many unusual and obscure conditions met with.

The investigation of the cause of death in connection with medico-legal cases is also carried out and demands a report to the Coroner; it is a subject of great interest and extreme difficulty under tropical conditions; it obviously requires a keen observation supplemented by an intimate knowledge of the habits, customs and poisons of the country; it equally obviously cannot be acquired except by years of patient and detailed work combined with control observations on the more normal causes of death and it becomes essential that detailed reports and investigations should be recorded so that something may be gained in the process of time.

Since October, following the arrival of the necessary apparatus, the performing of all Sachs Georgi reactions have been taken over from the Yaba Research Institute and has entailed a regular Sunday routine in order to supply the results with the minimum of delay.

The shorter biochemical tests are carried out when requested but I have not yet had the opportunity of performing the longer and more routine tests in this branch which should be done on the spot.

Museum.—A start has been made with an attempt at collecting material for the future museum and some unique specimens of pathological interest have been obtained already; my knowledge of this branch, unfortunately, is so small that I have had to rest content in allowing the material to remain in a tank of preservative until some future occasion. It is hoped to adopt a system of numbering so that the specimen can be studied in relation with the records of the case and the slides already made showing the histology, for I am convinced that only such a procedure will separate the more obscure conditions one from the other and remove them from common dumping grounds.

I.—EXAMINATION OF BLOOD.

(a) *Examination for Parasites.*—This is done in routine manner by the thick film method which has not only the advantages of simplicity in the making and staining but increases the chances of finding parasites as the following comparative table will show.

	1924	1925	1926
	(1st 3 months only)		
Total slides examined ...	1,507	192	3,387
Malaria findings ...	45	4	1,015
Percentages (approx.) ...	3%	2%	30%

The total number of films examined has amounted to 3,387 for the year 1926 and with the additional 487 for the last two months makes a total of 3,874 on which a report is necessary; of this total 826 were obtained from Europeans.

I.—MALARIA.

Out of the total examinations of 3,874 slides no less than 1,049 or 26.8% have shown the presence of parasites, the types met with being noted as follows with their approximate percentages.

Subtertian in 940 or 89.5%

Quartan in 98 or 9.3%

Benign tertian in 11 or 1.0%

I have arranged in graphic form the findings expressed as the monthly percentage distribution in correlation with the rainfall curve and it shows better than any description the more unhealthy periods of the year.

Out of the total quoted above 826 represent slides from Europeans amongst which were 154 positive cases representing 18.6% approximately; this appeals to me as a high percentage in view of the supposed prevalence of prophylactic quinine taking.

Crescents—I have not included these under the subtertian findings for they present several distinct features of interest. A total of seventy-three films have shown their presence making a percentage of rather under 2% of all the films examined.

In spite of the small number quoted, if the findings are arranged in their monthly incidence there is a very distinct suggestion that the crescent curve has two peaks, one at the beginning and the other at the end of the main rainfall curve; if this indication is repeated during the next year it might be of interest to investigate whether a corresponding sporozoite curve could be found by the dissection of the suspected or known type of carrier.

Benign Tertian.—Only a total of eleven cases have been met with, all but one were in natives, the European case had been infected elsewhere.

An interesting point is raised by the fact that these cases have only occurred during the last months of the year 1925 and 1926; the numbers are too few upon which to base any statement but there may be certain features suitable to the benign tertian parasite and its carrier at this particular time of year such as has been observed in other countries.

Quartan.—This type of infection forms quite a fair percentage of the positive slides, namely over 9%. There appears to be a tendency for the quartan curve to simulate the crescent curve namely a suggestion of a bigger incidence at the beginning and end of the main rainfall curve; another feature has been very commonly noticed and that is the chief occurrence of this type of infection in the early adolescent years of life.

Age incidence in Native infants.—Unfortunately again I am dealing with rather a small number of observations for I have only examined 168 infants of fifteen months and younger. While no case of

infection has been found in the first month of life, in the second month 50% were infected and eight out of nine showed parasites at the fifteenth month. Possibly the accumulation of parasites in the maternal placental circulation demonstrated by Blacklock may have its reason and value in starting the child off with a certain amount of passive immunity while it is acquiring an active one.

II.—RELAPSING FEVER.

Cases are still met with occasionally, a total of seven cases only being found in the fourteen months under review. The infection always appears to be a heavy one and is recognised with the greatest of ease by the thick film method.

III.—TRYPANOSOME INFECTIONS.

Three cases have been met with while examining bloods in a routine manner. In each case the patient was attending the out-patient department for some trivial complaint; one of the patients returned and was admitted for observation but trypanosomes were not found again and the patient appeared to be suffering no inconvenience.

IV.—MICROFILARIA INFECTIONS.

Three per cent. of the blood films examined have shown the presence of microfilaria. No attempt has been made to classify them except as follows:—

Large type—sheathed—1.3% approximately.

„ „ unsheathed 1.2% „

Small perstans type .3% „

(b) *Differential Counts etc.*—Very little of interest has been met with in these. Differential Leucocyte counts have amounted to fifty-eight, while total red and total white counts have amounted to fifty-two and eight respectively. Haemoglobin estimations amounted to forty-four but they were all done by Tallqvist's method and I have not had the time to carry out a more reliable method.

(c) *Van den Bergh Reactions.*—These have only totalled thirteen and have only been qualitative tests, the quantitative estimation being rendered valueless owing to the ingredients for the colour standard being unsatisfactory.

It is interesting to note however that only one case of obstructive type of jaundice was met with, all the others being toxic or infective in type.

(d) *Agglutination Reactions and Blood Cultures.*—I have included these together as they have been very few in number and each have been carried out for detection of the enteric group. One of the former and four of the latter only have been performed, in each case with negative results. The enteric group of infection appears to be rather conspicuous by its absence.

(e) *Sachs-Georgi Reactions.*—It was not until October that I was able to undertake these reactions as a routine and none were done before August. In many ways it is an inferior test to the full technique Wasserman reaction, the main one is the risks of contaminations growing during the prolonged incubation and unless one is prepared to recognise them they may cause false returns and the only satisfactory technique is one that ensures absolute sterility in all stages of the test as far as can be maintained. This was one of the first difficulties encountered in connection with sera despatched from long distances, for they were nearly always grossly contami-

nated and the test was impossible to carry out, leading to disappointment and annoyance to the sender and his patient; it certainly must have been equally unsatisfactory to the Medical Research Institute where the tests were carried out before being handed over to me. This difficulty delayed my start on the test and in order to try and rectify and correct this liability to contamination a trial was made with the addition of the simplest preservative used in foodstuffs, namely boric acid, to the sera after separation from the clot; to my astonishment sera exposed in test tubes on the laboratory table were found to be relatively quite difficult to contaminate and subsequent Sachs Georgi tests upon them appeared not to be affected within reasonable periods of delay. This method is now being given a trial, a circular having been issued advising the addition of a knife point of powdered boracic acid (about $\frac{1}{3}$ grain) to all sera after separation from the clot. This has certainly had the effect of allowing sera to arrive uncontaminated and time only will prove whether it is a safe proceeding.

Since August, only 127 Sachs Georgi reactions have been done, ninety-five on natives and thirty-two on Europeans; in the former group fifty-three were positive in various degrees and in the latter group, eight only.

Ganglion and Sachs Georgi Reactions.—An interesting fact has come to light in the question of the common ganglion as observed in West Africa. A whole series of Sachs Georgi reactions have been performed on cases showing the presence of a ganglion with practically uniformly very strongly positive results and I understand prompt cure by the usual arsenicals.

As the details of this condition will probably be the subject of a paper by Dr. I. G. MacGregor I will not detail any of the features except as have been observed by myself. I understand there is no superficial differentiation between this type of ganglion and those commonly observed in England but in those that have been opened by operation the tendon below the ganglion is found to show a fusiform swelling which on section shows more or less necrotic tissue but I have not been able to demonstrate the presence of spirochaetae in them.

II.—EXAMINATION OF FAECES.

A total of 1,081 specimens have been sent for investigation, 585 from natives and 496 from Europeans.

(a) *Natives.*—*Ascaris* infections are found to be heavy, 57.2% of the specimens showing their presence, while the ankylostome incidence has not proved higher than 25.4%.

Taenia infections do not appear to be common, only seven cases being identified.

Intestinal schistosomiasis infection has been found in eleven cases but I do not think this gives a real idea of the frequency of the infection for I have on several occasions found it at a post-mortem when specimens during life were negative.

Infections with *Entamoeba histolytica* or their cysts have been found on fifty occasions or 8.5 per cent.

(b) *Europeans.*—Intestinal infection with helminths is not common, only four *ascaris* infections and one *taenia* infection having been met with.

Entamoeba histolytica and their cysts have been found on twenty-two occasions only, that is 4.4%, no higher a percentage than can be found in England.

Dietetic errors appear to me to enter very largely in the intestinal disorders of Lagos, the tinned vegetables commonly used such as peas having raised my suspicions very frequently. Of the 496 specimens from Europeans fifteen or 3% approximately showed

evidence of irritative or inflammatory changes in the form of mucus and cellular exudate and blood and the findings in these cases were classified as follows:--

Amoebic dysentery	...	...	in 2
Bacillary dysentery	...	...	„ 1
Doubtful pathogenic amoebae	...	...	„ 1
Lamblia	...	...	„ 1
Negative but probably Bacillary dysentery	...	...	„ 4
Negative	...	...	„ 6

(c) *Entamoeba histolytica* Infections.—Taking Europeans and natives together the vegetative forms have been found on forty-nine occasions; of the twelve occasions on which they were found in Europeans no less than nine have been in stools showing only slight mucus as evidence of any thing unusual beyond the liquid or semi-liquid condition; the remaining three were more orthodox specimens containing blood, mucus and cellular exudate.

Among the thirty-seven occasions in which the vegetative forms were found in natives no less than nineteen showed the presence of blood, mucus and cellular exudate, though they have been found in any variety of loose stool.

The difference between these two classes of findings probably is explained by the earlier reporting of an intestinal illness among Europeans.

As regards the finding of cysts, these have been found only in stools showing no blood, mucus or cellular exudate whether Europeans or natives. They have been found on twenty-three occasions only. I should note that the fully developed cyst is not the usual one found, it being much commoner to find the earlier stages of encysting amoebae.

(d) *Bacillary Dysentery*.—The investigation into this condition was only begun in April, for various reasons, and during the eight months since then eleven cases have been definitely established; one of these was in a European who had long been regarded as an amoebic case with recurrences and subjected to constant dosing with emetine.

I believe the frequent occurrence of bacillary dysentery has escaped bacteriological confirmation up to the present time in Lagos and I do not understand the position in view of the ease with which it has been discovered during the last few months, unless it is the examination of specimens at the earliest opportunity which the present laboratory allows.

The early months of the rainy season and December seem to be the months of chief incidence.

Of the eleven cases isolated six belong to the Shiga group and the remaining five to the Flexner-Y group. The sugar reactions and the agglutinations, I think, leave no doubt as to the correctness of their position but in view of the previous doubt of the existence of bacillary dysentery in Lagos I shall have their identity further confirmed in England.

(e) *Table of Results*. The following tables give, in tabular form, the findings according to the character of the stool.

(a) NATIVES.

				B. M. and C. E.	M. and C. E.	M.	Others.
Entamœba histolytica	...	...	...	19	9	...	9
B. dysenteriae	...	...	...	10	...	...	...
Schistosoma mansoni	...	...	...	4	...	...	7
Ascaris	...	...	...	14	4	2	298
Ankylostome	...	...	...	11	14	1	123
Tænia	...	...	...	...	...	...	7
Lamblia	...	...	...	...	...	...	4
Entamœba histolytica cysts	...	...	...	...	...	...	13
Dietetic Errors	...	...	...	...	...	...	11
Negative, probably bacillary dysentery	...	...	...	7	...	...	...
Negative	...	...	...	14	24	10	117

(b) EUROPEANS.

Entamœba histolytica	...	...	...	3	...	3	6
B. dysenteriae	...	...	...	1	...	...	...
Ascaris	...	...	...	...	1	...	3
Tænia	...	...	...	...	...	...	1
Lamblia	...	...	...	1	...	1	6
Entamœba histolytica cysts	...	...	...	...	...	...	10
Dietetic Errors	...	...	...	...	...	...	54
Negative, probably bacillary	...	...	...	4	...	...	...
Negative	...	...	...	6	39	32	303

B = Blood.

M = Mucus.

C.E. = Cellular exudate.

There has of necessity been some reduplication in these figures owing to more than one abnormality being found sometimes in the same specimen.

III.—EXAMINATION OF URINES.

There is not a great deal of interest in these routine examinations; a total of 385 have been reported upon during the period under review; all but thirty-seven were from natives.

While albumen was found to be present in variable quantities in 120 cases only seventy-one of them showed casts, but that gives the percentage showing a certain amount of damage to the kidneys as over 18%.

The very prevalent habit of taking aphrodisiacal drugs amongst natives I feel sure leads to eventual damage.

Bile has been noted as present on twenty-two occasions, all in natives, which gives an idea of its frequency; it is a common complication of many conditions amongst natives.

Pyuria of course is a very frequent finding irrespective of any schistosome infection.

Urinary schistosomiasis has been detected on fifty-four occasions (15%) but that by no means overestimates the amount of infection prevalent, for frequently I have found the disease present at the post-mortem which had not been detected during life.

Probably schistosomiasis is very prevalent over most of Nigeria.

Two cases of glycosuria among natives was detected but whether they were real cases of diabetes I am not aware.

IV.—EXAMINATION OF SPUTA.

447 specimens have been received only forty-five of which were from Europeans.

Fifty-five samples from natives showed the presence of tubercle bacilli, while ten from Europeans showed the presence of the same organism.

On five occasions *B. pestis* was discovered, one from a European. On several occasions organisms rather suggestive of plague have been found in alleged specimens of sputa; they are unlike *B. pestis* in being more rod shaped but show bipolar staining and I fancy they must be a diphtheroid organism; the specimens in which they have been detected are usually proved not to be sputa but rather material from the throat commonly supplied by natives as sputum.

V.—MISCELLANEOUS.

Under this heading I have included all those various tests that are performed in a laboratory in insufficient numbers to deal with under individual headings and I have tabulated them as the best way of recording them.

Fluid from Lymph Scrotum	...	...	...	...	2
Nasal Swabs for Leprosy—all negative	...	...	...	...	7
Gland Punctures	...	<i>B. pestis</i>	...	...	7
		Staphylococci	...	...	2
		Negative	...	...	11
Urethral Pus	...	Gonococci	...	...	40
		Negative	...	...	47
Vaginal Pus	...	Gonococci	...	...	3
		Negative	...	...	13
Ulcers	...	<i>Spironema pallida</i>	...	...	3
		„ <i>pertenue</i>	...	...	1
		Negative	...	...	24
Cerebro Spinal Fluid	...	<i>Meningococcus</i>	...	...	1
		Staphylococci	...	...	1
		Pneumococci	...	...	2
		Negative	...	...	2
Throat Swabs	...	Vincent's organisms	...	...	2
		Negative	...	...	2
Pleural and Ascitic Fluids	...	..	...	...	7
Pus from abscesses	...	<i>Mycetoma</i>	...	...	1
		Staphylococci	...	...	11
		Negative	...	...	5
Pus from Eye	...	Gonococci	...	...	2
		Negative	...	...	3
Stomach Contents	...	...	...	...	1

VI.—POST-MORTEM WORK AND REPORTS ON THE MORE INTERESTING FINDINGS.

(a) *General*.—The usual complete unreliability of any history provided by a native patient or his friends and the difficulties of diagnosis make it the more essential for complete autopsies to be carried out in the tropics. The necessity of the most complete post-mortem again and again has been forced upon me and I have known of one occasion where at least four pathologists watching a two hours'

post-mortem on a jaundiced individual came, after consultation, to the diagnosis of a pneumococcal septicaemia; the head was opened somewhat later, fortunately, and found to be a 'bag of pus' of pneumococcal origin; and it has been no unusual event for me to regret making a preliminary diagnosis at a post-mortem before it had been quite completed for unless the whole of the viscera are removed and examined a multitude of traps await one. Under these and tropical conditions post-mortem work becomes an extremely arduous task for it practically means doing it oneself throughout.

Decomposition is so rapid that practically all histology becomes unsatisfactory after a delay of twelve hours and for research, into the details of morbid histology, means that there should be refrigeration.

A total of 256 autopsies have been performed, 200 on males and fifty-six on females.

(b) *Weights of Viscera*.—I have collected as many of these as I have been able to but there were no scales available in the Public Mortuary until recently so that the whole of my cases have not been dealt with as I would wish.

In order that they may be available, generally, for I think they are interesting observations and I know of no previous records, I have tabulated the findings.

Brain.—(Nineteen weighed, sixteen males, three females).

Four in children (up to ten years) $33\frac{1}{4}$ oz. to 49 oz.

Three in adolescents (eleven to fifteen years) $44\frac{1}{2}$ oz. to 46 oz.

Thirteen in adults (sixteen upwards) 40 oz. to $53\frac{3}{4}$ oz, average 46.5 oz.

(It is hoped to increase these figures largely during 1927).

Heart.—(117 weighed, ninety-six males, twenty-one females).

Eighteen children (up to ten years) varying from 1 oz. (meningitis) to 6 oz. (portal pyæmia).

Four adolescents (eleven to fifteen years) varying from $6\frac{1}{2}$ oz. (meningitis) to $8\frac{3}{4}$ oz. (portal pyæmia).

Ninety-five adults (sixteen years and upwards) comprising:

Fourteen females varying from $5\frac{1}{4}$ oz. (bilharzia) to $11\frac{1}{2}$ oz. (aortic).

Eighty-one males varying from 5 oz. (phthisis) to $19\frac{1}{4}$ oz. (arteriosclerosis). Excluding the big abnormalities this gives an average weight of 9.7 oz. for the male heart.

Right Lung.—(115 weighed, ninety-three males, twenty-two females).

Eighteen children (up to ten years) varying from $1\frac{3}{4}$ oz. (meningitis) to $8\frac{3}{4}$ oz. (plague).

Three adolescents (eleven to fifteen years) varying from $10\frac{1}{2}$ oz. (meningitis) to $19\frac{3}{4}$ oz. (pneumonia).

Ninety-four adults (sixteen years and upwards) comprising:

Fourteen females varying from $7\frac{1}{2}$ oz. (accident) to 40 oz. (pneumonia) which, excluding the pneumonias, gives an average of 13.5 oz.

Eighty males varying from $7\frac{1}{2}$ oz. (accident) to 58 oz. (generalised tubercle) which excluding gross abnormalities gave an average of 17.3 oz.

Left Lung.—(116 weighed, males ninety-four, females twenty-two).

Eighteen children (up to ten years) varying from $1\frac{1}{2}$ oz. (meningitis) to 8 oz. (plague).

Three adolescents (eleven to fifteen years) varying from $11\frac{1}{2}$ oz. to $12\frac{1}{2}$ oz.

Ninety-five adults (sixteen years and upwards) comprising:

Fourteen females, varying from 3 oz. (accident) to 21 oz. (pneumonia) and giving an average of 10.6 oz.

Eighty-one males, varying from $6\frac{1}{2}$ oz. (accident) to 58 oz. (pneumonia) and giving an average of 15 oz. after excluding the gross abnormalities.

Liver.—(121 weighed, males 102, females nineteen).

Sixteen children (up to ten years) varying from $6\frac{1}{2}$ oz. (meningitis) to 45 oz. (portal pyaemia).

Four adolescents (eleven to fifteen years) varying from 36 oz. (starvation) to $52\frac{1}{2}$ oz. (plague).

101 adults (sixteen years and upwards) comprising:

Twelve females, varying from 20 oz. (cirrhosis) to 62 oz. (plague) giving an average of 42.7 oz.

Eighty-nine males, varying from $30\frac{1}{2}$ oz. (phthisis) to 130 oz. (carcinoma) giving an average of 54.5 oz.

Spleen.—(139 weighed, males 113, females twenty-six).

Twenty-two children (up to ten years) varying from 1 oz. (bronchitis) to 10 oz. (plague).

Four adolescents (eleven to fifteen years) varying from 4 oz. (meningitis) to $10\frac{1}{2}$ oz. (plague).

113 adults (sixteen years and upwards) comprising:

Sixteen females, varying from $3\frac{3}{4}$ oz. (aortic) to $25\frac{1}{2}$ oz. (plague) giving an average of 9.4 oz.

Ninety-seven males, varying from 2 oz. (dysentery) to $34\frac{3}{4}$ oz. (plague) giving an average of 12 oz.

Right Kidney.—(124 weighed, males 101, females 23).

Seventeen children (up to ten years) varying from 1 oz. (meningitis) to $4\frac{1}{2}$ oz. (plague).

Four adolescents (eleven to fifteen years) varying from $2\frac{3}{4}$ oz. (meningitis) to 5 oz. (plague).

103 adults (sixteen years and upwards) comprising:

Fifteen females, varying from $1\frac{1}{2}$ oz. (accident) to $7\frac{1}{2}$ oz. (cystitis) giving an average of 3.8 oz.

Eighty-eight males, varying from $2\frac{1}{4}$ oz. (nephritis) to $10\frac{1}{2}$ oz. (surgical kidney) giving an average of 4.6 oz.

Left Kidney.—(125 weighed, males 102, females twenty-three).

Seventeen children (up to ten years) varying from 1 oz. (meningitis) to $3\frac{3}{4}$ oz. (plague).

Four adolescents (eleven to fifteen years) varying from $2\frac{1}{2}$ oz. (meningitis) to $5\frac{1}{2}$ oz. (plague).

104 adults (sixteen years and upwards) comprising:

Fifteen females, varying from 2 oz. (accident) to 7 oz. (cystitis) giving an average of 4 oz.

Eighty-nine males, varying from $2\frac{1}{4}$ oz. (nephritis) to $9\frac{3}{4}$ oz. (plague) giving an average of 4·9 oz.

(c) *Causes of Deaths*.—I have classified these in order of frequency as they probably convey some idea of the prevalence of diseases. The ages of the 256 individuals examined have varied between the new-born to those in the seventies; the greater proportion however were between the ages of twenty-six and forty years.

	Total.	Males.	Percent- age.	Females.	Percent- age.
Plague	50	41	(20·5)	9	(16)
Pneumonia, bronchitis and broncho- pneumonia	47	39	(20)	8	(14·2)
Injuries and drowning	39	28	(14)	11	(20)
Tuberculosis (various types)...	22	18	(9)	4	(7)
Intestinal diseases	20	17	(8·5)	3	(5·3)
Circulatory diseases	12	10	(5)	2	(3·5)
Sepsis	8	7	(3·5)	1	(1·8)
Genito-urinary	8	3	(1·5)	5	(9)
Nephritis... ..	7	6	(3)	1	(1·8)
Poisoning	7	6	(3)	1	(1·8)
Malignant diseases	7	5	(2·5)	2	(3·5)
Central nervous system	7	6	(3)	1	(1·8)
Helminthiasis	5	3	(1·5)	2	(3·5)
Liver diseases	4	3	(1·5)	1	(1·8)
Various	3	1	—	2	—
Unknown	10	7	—	3	—

There is a noticeably higher percentage for women among the Injuries and Accident group. The group described as 'unknown' includes those portions of bodies recovered from the Lagoon and those in which decomposition has proceeded so far as to be impossible to diagnose, usually they are also recovered from the sea. It will be more noticeable if the following negative features are alluded to; there has been no death in which the diagnosis of ankylostomiasis, malaria or amœbic liver has been made.

(d) *Causes of Death amongst Children*.—From the point of view of infant mortality I have classified the causes of death, amongst the forty-eight children that have been examined, into certain age groups.

i. Still born. Two examined, both discarded into the sea; one probably syphilitic.

ii. First year of life. Eleven examined with the following results:—

Respiratory diseases	6
Tuberculosis	1
Accident... ..	1
Intestinal disease	1
Meningitis	1
Septic Cord	1

iii. Thirteen months to five years, twenty examined with the following results : —

Respiratory Disease	...	...	7
Generalised Tuberculosis	...	...	3
Plague	...	...	2
Accidents	...	...	3
Intestinal Disease	...	...	2
Convulsions, Ascariasis	...	...	1
Convulsions, Enlarged Thymus	...	...	1
Found in the Sea, ? cause of death...			1

iv. Six to ten years of age, fifteen examined with the following results : —

Respiratory Disease	...	...	3
Plague	...	...	4
Accidents	...	...	5
Acute Yellow atrophy...	...	...	1
Portal Pyæmia, Bilharzia	...	...	1
Found in the Sea, ? cause of death...			1

Naturally malaria can be found in the majority of the cases but it is not more noticeable than when the cause of death can be ascribed to some other cause with the greatest certainty ; or even as it occurs in the majority of the living at these ages ; in any case where there is felt to be any uncertainty the brain has been examined to exclude cerebral malaria ; particularly has this applied to the two cases quoted above under the heading convulsions.

(e) *Medico-Legal Cases.*—

(i) *Accidental deaths* have numbered twenty grouped as follows :—

Suffocation.—One case, a collar stud impacted in the larynx.

Burns and Scalds.—Four cases, steam from a boiler accounted for one case while the other three were burns from petrol or kerosene ; the kerosene case was a lamp accident while one petrol case was due to a car accident, the other petrol case was an accident after an old woman had rubbed herself with petrol as a liniment.

Wounds.—Fifteen cases, five resulted from car accidents and four from train accidents while four cases occurred during employment ; only one case of gun accident was dealt with. The other case I have included under this heading was a case of electrocution, a car breaking a telephone wire standard which then fouled the electric lighting wire ; the current's points of exit and entrance being at the hand and the nape of the neck ; death in this case appeared to be an asphyxial one.

(ii) *Homicidal wounding*s totalled four : the wounds are so extensive as a rule in these cases that there is not much doubt as to their nature.

(iii) *Suicides.*—Three cases have been dealt with, a case of hanging, a case of strangulation in a police cell, and a case of stabbing of the abdomen.

(iv) *Found in the Sea.*—The main difficulties in this branch of the work have been met with in cases of bodies recovered from the sea or Lagoon the presence of which allows disposal of bodies after death either as a cheap method of burial or a ready method of dodging the attentions of the Sanitation Department in their control of infectious

diseases, particularly plague, and possibly of hiding crime. Decomposition is so rapid, the task is so unpleasant and so difficult under tropical conditions that it is almost forgivable to be cursory with the examination, almost encouraging degeneration into assuming that every thing that comes out of the sea has been drowned; I must personally admit that the more cases I see the more puzzled I become and the more eagerly I search for any evidence extraneous from the mere dissection, necessitating the prevention of any handling of the body or clothing by one's native assistants; this particularly applies to bodies found in sacks often with stones attached where much evidence of identity and cause of death may be lost by allowing one's assistants to remove the body from the sack or to unduly interfere.

(v) *Drowning*.—Ten cases have come under this heading. The period of time before the body floats is usually about thirty-six hours and in one case was as short as twelve hours.

Protrusion of the tongue has been noticed in all but one case which was the occasion when the body was recovered twelve hours after death; as this sign has been seen with equal frequency in those cases where the body has been discarded after death, it probably depends on the results of putrefactive changes; the extent of protrusion has been very marked in most cases. The wrinkled or sodden condition of the hands and feet frequently passes off with the gaseous distension of the tissues.

Foreign material in the respiratory tract and even in the lungs is the most deciding finding and has been detected in each case except one where I am not sure there was not a case of mistaken identity.

Water in the stomach has not been a noticeable point, either the stomach contains a large quantity of food or is empty, in the former case much of it may be forced out by high intra-abdominal pressure.

The lung findings have varied considerably also, apparently depending again on the extent of decomposition; they may be voluminous if the body is recovered rapidly or become collapsed, with exudation of dark coloured fluid into the pleural cavities, after about seventy-two hours.

Saponification is an interesting feature which has been observed and may appear as early as the fourth or fifth day, quite contrary to the usual time quoted for the colder conditions of European waters.

Death from apparent natural causes was returned for eight other cases recovered from the sea; five of these were enclosed in sacking or bedding with weights in the form of bricks or stones attached. The cause of death in these cases was pneumonia or broncho-pneumonia in four; still birth, plague, tuberculosis and malignant disease accounting for one each. The other five cases showed no conclusive evidence of drowning and decomposition was too advanced to make a diagnosis. It is of interest to note that sections of the lung in the pneumonia case still showed a certain amount of the morbid histology of that condition in spite of death and immersion in the sea being estimated at about four days.

In the whole of this group of cases only one showed the presence of foreign matter in the trachea and that was stomach contents only; no cause of death was found for this case.

(f) *Plague*.—It has been my fortune to be able to make a post-mortem examination of fifty cases of this disease during the period under review but I regret I must admit to having failed to make a complete post-mortem in thirteen instances, it having seemed an

unnecessary labour at the time when they were coming in faster than one would wish. The diagnosis in the majority of cases of course is most elementary but there have been occasions where there has been so little to go upon that the post-mortem of necessity becomes very complete before any suspicion of the condition has been aroused, this particularly seems to apply to the cases with jaundice. On one occasion a patient was admitted as a case of eclampsia but proved to be a case of plague at the post-mortem. Thirty-one cases have been examined at the hospital mortuary and nineteen at the public mortuary as Coroner's cases, the deaths having been sudden or otherwise open to suspicion. The hospital cases in many instances were so obscure as to give no cause of suspicion and were only diagnosed at the post-mortem; but many cases apparently were deliberately admitted in order to make some attempt at treatment by mercurochrome or perchloride of mercury in the form of intravenous injections.

The cases have grouped themselves according to the post-mortem findings as follows:—

Pneumonic four. Septicæmic eleven. Primarily Bubonic thirty-five.

The pneumonic cases each showed a considerable area of consolidation in one lung while the opposite side was free. They occurred from the middle of September to the middle of October but whether there is any climatic reason for this limitation is not known.

The septicæmic cases, where no point of entry has been found or infected gland to suggest it, have numbered eleven.

The bubonic cases, whether they died ultimately in the form of septicæmia or not, totalled thirty-five; the apparent primary gland affected being as follows:—

Femoral group	18
Cervical group	5
External Iliac group	4
Axillary group	3
Inguinal group	2

Submaxillary, bronchial and tonsil accounted for one each. It should be mentioned that many of these bubonic cases show no signs of any evident enlargement of the glands, a slight tumefaction or succulent condition of the affected gland alone being observed when they are cut down upon. Some of the interesting features in connection with these cases can now be mentioned.

Jaundice.—This condition has been noticed in eight cases and it has been a marked feature of those cases. Six of the cases were bubonic the other two being a pneumonic and a septicæmic case.

These cases, with the albuminuria that is associated with them, make an awkward combination in an alleged yellow fever country and make their diagnosis still more difficult. Jaundice being a fairly commonly observed feature in cases of ordinary pneumonia in natives suggests that possibly an associated lung condition may be the explanation but it is not borne out by the post-mortem findings; probably it is simply a toxæmic condition though I have not had the opportunity of confirming this by performing van den Berg's test on the serum.

Infarct-like patches in the Lungs.—Excluding the four definite pneumonia cases, thirty-five others had the lungs carefully examined and weighed; of these fourteen or 40% showed grey "infarct" like areas of consolidation.

These areas of consolidation which one observed so frequently are grey patches and often show a congested periphery; they vary in size from a small pea to the size of a small orange and are frequently roughly cone shaped with their base at the pleural surface though this is not invariable; in other words they appear to be infarcts. They may number only one or two or may be very numerous and give the suggestion of multiple nodules of secondary growth; on section they exude a thin watery serum which swarms with *B. pestis*.

Of the fourteen cases showing these infarcts, five would be classified clinically as bubonic cases, while in the remaining nine no infected gland could be traced by any abnormal appearance.

The spleen smears frequently in these cases do not show *B. pestis*. In association with one of these cases showing infarcts in the lungs were found congested areas in the urinary bladder which gave the impression of bilharzia and one was excised and sectioned with the result that an embolic patch of *B. pestis* was discovered.

Splenomegaly has been found to be almost a constant feature and some of the biggest spleens I have seen have been found in this disease. The average weight among twenty that were weighed gave a result of $16\frac{1}{2}$ oz., the maximum observed being 34 oz.

Foam at the mouth or nostrils has been a noticeable feature of twelve cases; it does not appear to be associated with any very advanced changes in the lungs for it has been found in cases only showing oedema and congestion of those viscera.

It probably is only evidence of waterlogging but I have never observed it so commonly except in cases of drowning.

Bacteriology.—I have not had sufficient time to investigate this point beyond the usual smears taken from various organs. A culture has been taken on three occasions only and each time they have behaved in the usual accepted manner. It has been noticed sometimes that in films taken during post-mortem procedure that the bipolar staining may be rendered obscure, easily, by over-staining; whether this means an alteration in the viability of the bacillus I am not aware.

In the bubonic cases it is not at all unusual to find the bacilli in almost coccoid form while those in the spleen of the same case are quite characteristic.

Still another feature that has been noticed in some cases is the tendency of the organism in the spleen or lung to be found in agglutinated clumps and not uniformly spread through the film.

Case showing emboli in bladder wall.—A man of about fifty years admitted complaining of injuries to his face due to a fall and with a temperature of 100°F where it remained roughly until his death four days later. Nothing was noted except the abrasions on his face and a marked leucocytosis. Post-mortem, no unusual glandular enlargements were detected.

Each lower lobe of the lungs showed about half a dozen small ecchymotic patches at the surface which on section showed a grey centre and a hæmorrhagic halo. The spleen was somewhat enlarged and showed a few petechiæ. The urinary bladder was thicker than normal and showed about four hæmorrhagic patches on its inner surface, each was about quarter inch in diameter, slightly raised and showed a small grey centre. Smears from the lung patches, the spleen and the bladder patches all showed *B. pestis*.

A case suspected as possible yellow fever.—A man of twenty-six years was admitted complaining of having had a rigor on the second and third day previous to admission though he was able to continue his work; on the day before admission he stated he had high fever and pain in his stomach. He was admitted with a temperature of 101°F looking extremely ill and not caring to be roused; he was markedly jaundiced and had considerable epigastric pain but had no vomiting. The urine contained much albumen, showed bile and many bile-stained granular casts. Death followed thirty-six hours later.

At the post-mortem slight glands were felt in both groins, left axilla and right epitrochlear but there was no oedema or tumefaction over them. The visceral pericardium showed a few petechiæ; the lungs showed basal congestion only.

The liver was a uniform yellow ochre colour with loss of distinctness of the lobules. The spleen weighed $24\frac{1}{2}$ oz. and showed nothing else unusual. The kidneys weighed six ounces each and their cortex appeared prominent and somewhat swollen.

The glands of the left femoral group and right epitrochlear were examined and showed *B. pestis* as did also the spleen.

A case with possible origin in the tonsils.—A man of twenty-seven years was admitted with a history of pain in the front of his chest for one day. The temperature varied between 104° and 100.6°F with respirations between twenty-four and twenty-eight and the blood showed a marked leucocytosis. Death followed forty-eight hours later. At the post-mortem there was much white froth exuding from the nostrils; no glandular enlargements were observed; there were a few petechiæ on the visceral layer of the pericardium and the uppermost part of the pericardial sac was very oedematous.

The lungs were heavy and oedematous without consolidation but a few small hæmorrhages were present in the substance. The mediastinum felt as if an aneurysm was to be found but the cause of the condition was a marked hæmorrhagic infiltration in and around the mediastinal glands. The tonsils were enlarged and rather red. Nothing very much else of note was found but the urine was found to be loaded with albumen and showed a few granular casts. Smears from a tonsil, and the spleen and bronchial glands showed *B. pestis*.

A case with marked skin lesion.—A man of twenty-one years was admitted with a temperature of 105°F and complaining of pain in his back which showed a tender inflamed area about three inches in diameter on his right loin; this later showed a central vesicle from which a pure growth of plague bacilli was obtained; this inflamed area was so hard and large it was suspected to be a severe carbuncle. Death took place thirty hours after admission by which time there was marked jaundice.

Unfortunately no post-mortem examination was made beyond examining the glands in the right inguinal area; they were found to be slightly enlarged but not hæmorrhagic and they showed many *B. pestis*.

Comments on the Plague Cases.—The following features have impressed me about these cases; firstly that though the post-mortem diagnosis is generally very obvious and easy there may be some cases very difficult to determine though when the right area has been found in these cases the diagnosis from the smears is obvious.

The most marked feature however that has impressed me is the frequency of the infarct-like areas of consolidation in the lungs in any type of the disease and the heavily infected nature of these areas with the plague bacillus, apparently by itself. It would seem that a large proportion of plague cases whether bubonic or not are potentially in the position to commence a pneumonic outbreak and I cannot see the need to introduce any question of symbiosis or factors other than a balance between climatic conditions, the conditions of the immediate surroundings of the patient and the number of plague organisms he happens to be expelling; probably the main factor against the frequency of pneumonic spread from these cases is that death supervenes before many of the organisms are sufficiently free to be spread by coughing.

A climatic factor is rather suggested by the grouping of the pneumonic cases to a certain period of the year but the figures and my experience are too limited at present to do more than mention the fact. Being unaware of the morbid anatomy of plague elsewhere, I do not know whether there is a greater tendency to the infarct-like areas in the lungs of West African natives, but the ambulatory fashion in which the average African native treats disease suggests that it might be more easily produced by that means.

(g) *Diseases of the circulatory system.*—Most of the cardiac cases met with are affections of the heart muscle or the aorta and it is usual to find cases that have been diagnosed as mitral disease to be cases of cardiac dilation and failure from some other cause. The cardiac lesions of rheumatic origin are conspicuous by their absence and malignant endocarditis is rare.

Aneurysms.—Six have been examined at a post-mortem and were of the following types:—

Thoracic in four; two at the commencement of the descending aorta with pressure on the left bronchus and œsophagus; two at the top of the arch with pressure on the trachea.

A case of abdominal aneurysm.—A man about twenty-eight years of age was admitted with a fortnight's history of pain in the abdomen and unable to eat; he died suddenly seven days after admission. Well-marked syphilitic disease of the aorta was found at the post-mortem and a saccular aneurysm was present immediately below the diaphragm arising in the aorta about the region of the coeliac artery; a slow oozing had taken place and tracked upwards above the diaphragm between the crura and formed a mass of clot in the tissues behind the œsophagus and in the root of the left lung.

A case of cardiac aneurysm.—A man of twenty-one years was admitted with œdema of the feet and enlarged liver of some duration and regarded as a case of mitral disease. At the post-mortem the heart weighed $15\frac{1}{2}$ oz. and the left ventricle was much thickened. Bulging posteriorly from the left ventricle were two hernial protrusions each about the size of a small tangerine orange and their walls were much thinned.

The one more to the right of the two involved only muscle tissue but the one more to the left also bulged through above one of the mitral valves and showed a perforation into the left auricle.

A case of? infarct of the heart.—A man aged thirty-five was admitted as a suspected acute abdomen, with severe pain at the upper part of his abdomen and vomiting, but the knife was withheld owing to the slow pulse. There was no fever, no œdema but intense pain in the epigastrium; the pulse became more and more slow registering forty-four per minute shortly before death twenty-four hours after admission. At the post-mortem an old infarct of the

left kidney was found, the liver was very congested, nutmeg and yellowish in colour but no gummata were found. The heart weighed $15\frac{1}{2}$ oz. and the right ventricle was very dilated and thinned and the mitral and tricuspid rings were also dilated. The left ventricle was not thinned but flabby. There was gross syphilitic disease of the aorta which continued close down on to the aortic ring where two of the valves showed small granulations which had extended through into the right auriculo-ventricular opening. The right coronary artery was occluded. The interventricular wall below the aortic cusps showed a large oval pale area which on section had a necrotic centre.

A case of embolism of the abdominal aorta.—A man aged about forty was brought to the out-patient room complaining of weakness and swelling of his legs of three days duration and he also had a burn of the first degree on the left leg probably caused by native treatment. He collapsed on attempting to stand and a wet gassy gangrene of both legs rapidly developed ending with death about forty-eight hours after admission.

At the post-mortem he was noticed to be jaundiced: the abdominal aorta was found to be completely blocked at the bifurcation into the common iliacs, clot extending into both these arteries. The heart weighed $9\frac{1}{2}$ oz., the pericardium was healthy but the endocardium at the apex of the inner wall of the left ventricle showed a roughened grey surface as if a thrombus had been adherent there and was quite sharply limited above. The coronaries were healthy as far as could be made out as was also the aorta and there was no valvular disease.

There was an ischaemic necrosis of the rectus abdominis for about two inches above the symphysis pubis. Microscopically the endocardium at the area above mentioned showed small haemorrhages and inflammatory invasion with polymorph cells; the kidney cortex showed vertical streaks of necrosis but no inflammatory changes in those areas.

(h) *Tuberculosis cases.*—Four cases have been in the form of chronic pulmonary disease with cavities in the upper lobes.

Tubercular pericarditis.—Three marked cases have been met with two having spread presumably from glands but one I think was undoubtedly a primary case.

Primary tubercular pericarditis.—A native butcher aged about fifty years was admitted as a case of suspected liver abscess, giving a ten days history of pain in his right side and cough, but the differential count did not support the view. He ran an almost continued fever about the 102 line for the seven days he was in hospital. At the post-mortem it was noticed he had an old dactylitis of the right forefinger with ankylosis of two joints. The pericardial sac measured about eight inches across on opening the thorax and was distended with blood-stained fluid and much haemorrhagic shaggy deposit on its parietal surface. The sac itself was about quarter inch thick and the cut edges showed a few tubercles but none were visible on the surfaces. The heart and pericardial sac together weighed forty-two ounces; there were no caseous changes in the pericardium or heart.

The lungs showed a very few tubercles just beginning to break down, while on the visceral and parietal pleura on both sides one or two tubercles only could be found. No tubercles were found elsewhere in the body but there were some scars in the bronchial glands. Sections of the pericardium and heart muscles showed well-marked small areas of necrosis with giant-celled systems.

Tubercular pericarditis, probably secondary.—Case (i). A very thin man about thirty-six years of age was admitted giving a six months history of oedema of the legs and cough for two months: there was slight fever during the five days in hospital. At the post-mortem the whole pericardium was found to be firmly adherent to the heart, much thickened and studded with tubercles some of which were caseating; the walls of the auricles were oedematous. Both lungs were riddled with tubercular nodules none bigger than a small pea. The bronchial glands were enlarged and showed areas of caseation as were also some of the retro-peritoneal glands; but the main feature was the advanced pericardial condition.

Case (ii). A youth of about twenty-three was admitted giving only a five days history of pain in the right side and died within twenty-four hours. At the post-mortem the body was not particularly thin. On opening the thorax the pericardial sac was found to be much enlarged and could not be separated from the heart, the two together weighing forty ounces. The pericardium was thickened to about one inch and the tissues generally were oedematous; on section there was much caseation in parts of the thickened pericardium and the heart wall was involved in places, otherwise there was no disease of the heart. The bronchial and mediastinal glands were enlarged and showed large areas of caseation but no other glands were found to be involved; the pleurae and the right upper lobe of the lungs showed many small tubercles which appeared to have spread from the mediastinal glands: the most advanced feature however was the tubercular condition of the pericardium.

Tabes Mesenterica—or perhaps generalised tubercular adenitis would be the better term. Cases of this condition have been fairly numerous, eleven cases being met with among the 256 post-mortems performed. All ages appear to be affected the youngest being five months and the oldest sixty years.

It appears to be a condition that is frequently obscure for the preliminary diagnoses have varied from beri-beri to liver abscess. I understand there is more so-called fresh milk drunk amongst natives than is generally suspected but other unpleasant native habits must also materially help in the spread of the condition.

By the time of the post-mortem a generalised tubercular disease has usually supervened. The cases are all so similar I will not enumerate them, but simply state that as a rule the mesenteric or retroperitoneal glands or both are usually much enlarged, matted and caseous; the bronchial glands may be similarly affected. Spread to the viscera is usual and ascites may or may not be present. A tumid abdomen, with the marked wasting of the rest of the body showing up in contrast, has been rather a typical picture in the more chronic cases.

(i) *Malignant disease.*—Owing to the widespread belief that malignant disease is rare among primitive races it is advisable to record all undoubted cases.

(i) *Squamous-celled carcinoma of urinary bladder.*—Found in a man of sixty-five picked up dead in the street. The bladder showed a fungating growth at its upper part and had ulcerated through into two knuckles of small bowel to which it was adherent. Both kidneys were in a state of pyonephrosis. No secondary growth was found, much keratinisation of the growth was evident in the sections.

(ii) *Spheroidal-celled carcinoma of urinary bladder.*—A woman of about twenty-eight years from whom no history was obtainable, died within forty-eight hours of admission having been diagnosed as cystitis and hydronephrosis after the tapping of a cystic tumour through the right flank.

Some slight generalised œdema was present. The abdomen contained a large quantity of slightly blood-stained fluid. The right kidney weighed $7\frac{1}{2}$ oz. and was lying almost free in a large cyst caused by the lifting up of the capsule and the left kidney was in an early stage of the same condition. The bladder practically was only an abscess cavity with a wall an inch thick occupied by growth which blocked up the ureteric orifices and had spread as an almost cartilaginous material up both the ureters and these appeared to be canalised by urine containing spaces. Microscopically the growth showed much colloidal degeneration and was a carcinoma of the spheroidal-celled type.

No secondary growths were found and no bilharziosis.

(iii) *Squamous-celled carcinoma of urinary bladder*.—A man alleged to be twenty-six years old, but probably nearer forty-six, with a ten days history of diarrhoea and was very wasted. The peritoneal sac was a mass of grey nodules scattered over both visceral and parietal layers. Coils of intestine were adherent to the urinary bladder which was in an almost necrotic condition on its inner surface with its upper portion occupied by a growth. There was also a marked perilobular cirrhosis of the liver. The sections show a squamous-celled carcinoma of the bladder wall with marked keratinisation, similar features being reproduced in the peritoneal nodules.

(iv) *Primary carcinoma of liver*.—A man stated to be twenty-eight years old was admitted as a suspected case of liver abscess giving a history of ten days swelling of the abdomen. Death took place in twenty-four hours. The peritoneal sac contained a large quantity of bloody fluid. The liver weighed 130 oz., was very soft with rounded edges and the surface was studded with yellow nodules varying in size from a quarter inch to two inches in diameter, a larger mass as big as a fist was on the under surface and was largely broken down. No secondary growths were found. Microscopically the growth is a columnar-celled carcinoma.

(v) *A case of lymphosarcoma*.—A woman of about thirty years whose body had been discarded into the sea after death, and hence decomposition was advanced, but the retro-peritoneal glands were found to be much enlarged and formed a mass of soft white new growth; the bronchial glands were involved apparently secondarily, no other growths were found. The histology was sadly affected by post-mortem changes but the morbid anatomy and what could be made out histologically support the above diagnosis.

(vi) *A case of lymphosarcoma*.—A man of about thirty-five years who was admitted giving a three days history of passing stools of dysenteric type; a few histolytica cysts were found in the fæces to support the diagnosis and his stools improved with emetine: he developed signs of intestinal obstruction and an exploratory laparotomy was performed but he died shortly afterwards. A post-mortem was performed shortly after death and masses of new growth were found in the mesentery and had a tendency to become necrotic; the lower portion of the ileum was studded with growth which appeared to have originated in the Peyer's patches; some of these were as large as a walnut and bulged into the lumen of the bowel; in a few of these there was some ulceration commencing in the bowel. The growth was very soft and white and had a tendency to break down. The neighbourhood of the ileocaecal valve was chiefly involved and the growth had spread from there over the rectum and top of the bladder. No secondary growths elsewhere were found.

Histologically this new growth was a lymphosarcoma.

(vii) *A case of? endothelioma*.—A prisoner aged twenty-eight had been recently an in-patient of the hospital suffering from what was diagnosed as a pneumonia. He was returned to the prison and had no fever for a week but was then readmitted with a severe cough and fever at night, dying a fortnight later. Rather blood-stained but non-purulent pleural effusion had previously been withdrawn from his right chest.

Post-mortem there was still much rather blood-stained fluid in each pleural cavity and the bronchial glands were a mass of white, very soft encephaloid type of new growth. In the abdomen a mass of retroperitoneal glands in a similar state were found surrounding the aorta in the neighbourhood of the pancreas.

The digestive tract was unaffected and the only secondary growth found was in the spleen where was found three or four nodules about the size of a cherry and were soft and white.

Histologically this new growth suggests an endothelioma.

(viii) *A case of spheroidal-celled carcinoma*.—A piece of tumour removed from the neck of a man of about thirty-five years of age. Histologically it turns out to be a spheroidal-celled carcinoma.

The patient left hospital shortly afterwards and the later history is not known.

(ix) *A case of spheroidal-celled carcinoma*.—A fungating growth of the stomach was found at the post-mortem of a man dying at the Infectious Diseases Hospital. Histologically it is a spheroidal celled carcinoma with a good deal of fibrosis.

(j). *Carbon tetrachloride poisoning*.—The first case recognised as due to this cause was diagnosed in April 1926 but on looking through my records I am inclined to regard a case of suspected 'ackee' poisoning as really one due to this drug and I am referring to it as case 5 to be described shortly but I am beginning with my comments and summary of the cases. The cases I shall describe in some detail as I think they are of interest and are the subject of a separate report to the Director of Medical and Sanitary Service.

COMMENTS AND SUMMARY.

The cases as far as can be made out present a fairly uniform picture but owing to the absence of notes very detailed statements are not possible but the following appear to be the salient features:—

1. Death in coma from thirty to sixty hours after the administration of the drug according to the age of the individual.
2. Jaundice as a rule is present but not marked; vomiting occurs and the vomitus may contain altered blood.
3. Marked albuminuria usually develops.
4. Liver not wasted and shows a curiously marbled grey and orange pattern on the cut surface. Microscopically there is a marked central and mid-zone necrosis of the lobules with marked fatty degeneration.
5. Kidneys may not show much alteration to the naked eye but microscopically the convoluted tubules show well-marked fatty degeneration.

The cases have been placed in their order of occurrence except case 5 which though actually the first in time has been placed last as the facts are not completely established. Case 3 alone was an in-patient, the other cases having been treated as out-patients though cases 4 and 5 were admitted before death occurred.

Perhaps a hint is given here as to the advisability of treatment within the hospital.

The drug used has been an extra pure variety of Carbon tetrachloride obtained from the British drug houses and given the name of Tetraform.

The recognised tests for sulphur impurities have been carried out on all samples and invariably have proved negative. I myself have carried out some of these tests with equally negative results, after I recognised the first case.

The doses employed have varied from five minims to one drachm, the former in a child of ten months and the latter in patients from sixteen years upwards; in each case oil of Chenopodium has been given at the same time in doses of three to fifteen minims.

An aperient had been administered in each case except one where a definite error appears to have been made in omitting that precaution. I do not feel in a position to discuss the question of dosage except to say I think perhaps they have been rather large for the younger patients though I fancy they conform to the recognised teaching in the matter.

A SUGGESTION.

Carbon tetrachloride being such a close chemical relative to chloroform raises the suggestion that there is a similarity in its mode of action. The prevalence of fatty livers may account for a greater vulnerability of that organ but whether this condition can be associated with a liberal palm oil diet is not clear though the curious palm oil colour of subcutaneous fat commonly observed at autopsies is distinctly suggestive. Certain recent cases of delayed chloroform poisoning also seem to suggest that vulnerability of the liver of the local population is a factor to be recognised.

The similarity of these cases of carbon tetrachloride poisoning to delayed chloroform poisoning also suggests that the marked protective power of sugar against the latter may be equally protective against the former.

Case 1.—A well-nourished female negro child aged three years attended the out-patient department for "worms" on April 14th, 1926 and was given the following mixture to be taken on the morning of April 15th.

Tetraform ℥ v.
Ol Chenopod ℥ iii.
Ol Ric Drachm ʒ ii.

The mother returned without the child on April 17th and received six doses of Hyd c Creta Grs. ii, one to be given to the child on consecutive mornings but she returned later in the day to say the child was dead.

On a Coroner's order I performed (twenty-four hours after death) a post-mortem examination and reserved the stomach and duodenal contents for further investigation by the Government Analyst but he was unable to detect any poisonous substance. The liver which weighed 16 oz. had a very unusual appearance being rather orange in general colour which was located around the portal radicles the remainder of each lobule being greyish in colour so that a marbled appearance resulted.

There was no jaundice; the lungs, $3\frac{3}{4}$ and 3 oz. respectively, were markedly congested with redder patches suggestive of hæmorrhages but no sign of consolidation.

The brain weighed $41\frac{1}{2}$ oz. with some congestion as the only point of note. The spleen weighed 1 oz. and was rather soft and not very dark in colour. The kidneys, $1\frac{1}{2}$ oz. each, only showed some congestion. The bladder was empty so that no specimen of urine could be examined.

Microscopically there was found, unfortunately, much invasion by post-mortem organisms of the tissues but the liver showed marked central necrosis with fine droplets of fat in the central and mid-zones while the periphery of the lobule showed a coarser deposit of fat. The lung showed marked congestion only, as did also the spleen. The kidney was not sectioned.

Case 2.—Occurred within a few days of the case just described. A male negro child aged ten months was brought to the out-patient department and was treated for worms, being given of the morning of April 20th the following mixture.

Tetraform ℥ v.

Ol Chenopod ℥ iii.

Ol Ric ʒ ii.

The child was brought back on the morning of April 22nd and was said to have passed five "worms" but later in the day the child died and a post-mortem examination was made six hours after death.

The child was very well nourished and showed a tinge of jaundice in the conjunctivæ.

The brain, heart and lungs showed no evidence of disease. There were marked adhesions round the liver and spleen so that they had to be dissected out.

The stomach appeared quite healthy and there was nothing very unusual in the intestines but they showed a good deal of oily mucoid material. The contents of the large and small intestines, macerated portions of liver and the urine were sent to the Government Analyst but he was unable to isolate any substance to account for the death.

The liver weighed $11\frac{1}{2}$ oz. and was orange-coloured with a grey tracery pattern as in Case 1. The spleen was very dark and firm and weighed $3\frac{1}{2}$ oz. and the kidneys, $1\frac{1}{2}$ and $1\frac{3}{4}$ oz. respectively, showed no apparent changes to the naked eye. The urine collected post-mortem showed slight bile, much albumen but no casts.

Smears from the blood and brain showed no malaria but malarial pigment was present in the spleen smears.

Microscopically the liver showed marked central necrosis with extensive fine fat droplets in the central and mid-zones but bigger droplets at the periphery of the lobules.

The kidney showed fine fatty change in the convoluted tubules and straight tubules but the nuclei still stained fairly well and there was not much evidence of any necrosis.

Case 3.—A negro youth aged sixteen years was an in-patient being admitted on May 26th with colic and slight diarrhoea and ascaris ova were found in the stools. On the morning of May 29th the following mixture was given:—

Tetraform ʒ i.

Ol Chenopod ℥ xv.

which was followed a few hours later by an ounce of castor oil and eight round worms were passed.

The patient died in a comatose condition at 9 a.m. on June 1st, sixty hours after the administration of the tetraform.

The urine on the day of admission showed no albumen and there was no fever of note. A post-mortem was performed two hours after death.

A tinge of jaundice was present in the conjunctivæ and rigor mortis was commencing. The lungs were a uniform deep red in colour and there was no consolidation and no petechiæ observed. The heart weighed nine oz. and showed nothing abnormal.

The peritoneum appeared healthy and no petechiæ were noticed. The stomach showed some bilious material but neither it nor the small intestine showed any signs of disease though the whole mucous membrane of the latter appeared rather pinker than normal. Except that the solitary glands appeared to be unusually prominent there was nothing of note in the large intestine.

The liver weighed forty-one oz., was light-yellowish with orange brown trabecular markings, the gall bladder was distended with thick bile but there was no obstruction in the biliary passages.

The spleen weighed fourteen and a half oz., was firm and dark-red in colour. The kidneys weighed four and a quarter oz. and four oz. respectively and showed nothing startling except a general haziness of the cortex. The urine showed a thick cloud of albumen with granular casts and bile. Nothing else of note was discovered. Microscopically the liver showed a marked central and mid-zone necrosis where the tissue was stippled with fine fat droplets, the only normal-looking liver cells were clustered in islands around the portal radicles and they showed a heavy infiltration with large fat droplets. The central and mid-zone areas appeared to consist chiefly of reticulo-endothelial tissue, all the capillaries being distended with blood and there appeared to be some round-celled invasion of this area as if the necrotic liver cells were being removed. The spleen only appeared to be congested. The kidney showed extreme fatty change, fat droplets being found throughout the tubular systems but the glomeruli appeared unaffected; the cells lining the tubules were indistinct in outline, were desquamating and filling up the tubule spaces but their nuclei stained pretty well. The lung only showed signs of congestion.

Case 4.—A negro youth twenty-five years of age attended the out-patients department on June 28th with a temperature of 101.4°F and complained of fever of about seven days duration and said he was suffering from worms; he was given:—

Tetraform 3 i.

Ol Chenopod m xv.

but no purgative followed this treatment.

He returned the next day and was admitted complaining of pain in the epigastrium and said he had passed two round worms. There was a trace of jaundice and the temperature varied between 100 and 104 on the day of admission. On June 30th the temperature varied between 98.6 and 101 with corresponding pulse rate. He was restless, vomited bilious material on several occasions, became more jaundiced and failed to pass any urine.

On July 1st a small amount of urine was removed by catheter and was found to be heavily loaded with albumen, showed much bile and many granular casts. Moderate vomiting continued and became coffee ground in appearance and showed the presence of occult blood. He continued very restless and a persistent hicough developed and he was becoming comatose. Temperature varied between 97 and 98.6 during the day and a few subtertian parasites were found in the peripheral blood. The liver was enlarged and

very tender but beyond this the physical examination did not reveal much. The patient died at 1 a.m. on July 2nd. A post-mortem examination was made nine and a half hours after death. The body was well nourished and the conjunctivæ showed a slight icterus. The heart showed a few petechiæ on the pericardial and endocardial surfaces and the muscle appeared paler than normal.

The stomach did not show any definite petechiæ and no definite lesion could be found to account for the blood in the vomit, but there were a few petechiæ in the duodenum. The liver weighed fifty-four and a half oz. and in the upper part of the right lobe was an old encapsuled abscess cavity measuring 6×5 centimeters and containing slimy blood-stained pus. The sectioned surface of the liver was remarkably marbled showing areas of red surrounded by a tracery of yellow tissue.

The kidneys weighed six and a half oz. each and were much congested and showed no marked demarcation between cortex and medulla which was rather clay coloured. The pelvis of the right kidney showed a few very fine patches of hæmorrhage. There was nothing unusual in the condition of the spleen or lungs except a marked œdema and congestion in the latter, particularly posteriorly.

Microscopically the liver showed marked central and mid-zone necrosis which area was finely stippled with fat, the peripheral zone alone showed normal liver cells disposed in a ring about the portal radicles and these liver cells contained fat in larger droplets. The central and mid-zones show an occasional badly-staining liver cell but the reticulo-endothelial system remains and stains well and the capillary vessels were engorged but there is no invasion yet by small cells.

The kidney does not show such marked fatty change as in case 3 but there is well marked fine stippling with fat in the convoluted tubes and the descending tubes of Henle; the straight tubules and the glomeruli seem to be unaffected. In the fat-containing situations the nuclei do not stain well and the cell outlines are indistinct and a good deal of shedding of epithelium has taken place.

The lung shows considerable engorgement and some œdema and small hæmorrhages into the alveoli.

The spleen is congested and shows nothing of note beyond the usual deposit of malarial pigment.

Heart muscle by the usual stains did not show anything of note but no fat stain was tried.

Case 5.—A male negro child aged ten years, a brother of one of the hospital dispensers, was taken acutely ill on the evening of February 20th and was admitted to hospital in the afternoon of February 21st with a history of vomiting and intense abdominal pain.

He was very restless and quite unconscious and had a cry which was described as cerebral. The temperature varied between 98° and 101° F. He died in a comatose condition on the evening of February 21st and a post-mortem was performed the next day about ten hours after death.

There was no icterus; a few sores from jiggers were present on the legs and the glands in the groin were somewhat enlarged. The upper gum margins were rather swollen but he was not ill-nourished.

The brain weighed 46 oz. and was slightly congested only and showed no evidence of malaria.

Pericardial fluid was not in excess and the heart which weighed $4\frac{1}{2}$ oz. was healthy except for a few petechiæ over the left ventricle.

The lungs weighed 6 and 5½ oz. respectively and only showed some hypostatic congestion.

There was a slight amount of peritoneal fluid present.

The stomach showed altered blood and some mucous material but no ecchymoses were seen; there were two slight ecchymoses in the ileum.

The liver weighed 25 oz. and the cut surface showed irregular orange-coloured islands with surrounding greyish tissue, giving a marbled appearance. The spleen weighed 8 oz., was dark red and firm and the kidneys, 3 and 3½ oz. respectively and showed no outstanding change beyond congestion. The bladder was distended with urine which showed a thin cloud of albumen and some granular casts but no bile.

The contents of the stomach, large and small intestine, urine and a macerated portion of liver were sent to the Government Analyst with the suggestion that the case may be one of 'ackee' poisoning.

The results of this investigation unfortunately were not very convincing and in the absence of any definite history of having eaten any ackee fruit and the suggestive relationship to a hospital dispenser supported by the microscopical examination lead me to the diagnosis of carbon tetrachloride poisoning as the more probable one. The character of the case being quite unexpected and the pathological appearance of the two conditions being quite new to me, no tissues were reserved for fat staining but the microscopical appearance of the tissues stained by the ordinary methods are so similar to the previous cases in this report that I cannot separate them.

Microscopically the liver showed a very marked central necrosis spreading well into the mid-zone and in those areas very few liver cells remain but the small nuclei of the reticulo-endothelial cells stand out prominently and in this area also there is marked engorgement of the venules. Vacuolation of the liver cells at the periphery of the lobules is very noticeable and spreads into the mid-zone and a finer vacuolation is also present in the central zone, the fatty change there apparently occurring in the necrosed liver cells.

The kidney's convoluted tubes show a swollen epithelium, the nuclei of which do not stain quite so well as usual and the fine vacuolation of the cells suggests a good deal of fatty change which appears more noticeably at their periphery. The glomeruli show some congestion only and the straight tubules appear to be unaffected.

The spleen showed congestion which in some areas almost amounted to hæmorrhages—there was marked malarial pigmentation.

(k) *Bilharzial infections with portal pyæmia, nephritic and splenic abscess.*—I would like to make a preliminary note of the prevalence of a combination of two or more of the above findings with a view to expanding it further when a greater series of cases have been met with. Besides the few cases mentioned below, other cases of portal pyæmia with splenic abscess have been met with but, though they are not completely proven so that I cannot include them here, I am inclined to regard them as bilharzial in origin as a result of the further examination of the liver sections. In none of the following cases of *Schistosoma mansoni* infections have the ova been found in the specimens of fæces so that probably infections with this trematode are not so uncommon as they appear to be from the records; it may be noted here again that a total of eleven cases were found during the routine examination of fæces recorded elsewhere in this report.

Case 1.—A man aged twenty-six, giving no history and who died within twenty-four hours of admission after having fever between 101 and 104 and a marked leucocytosis. The lower part of the large intestine showed many hæmorrhagic areas but without apparent ulceration. The liver which weighed 88 ounces was congested, had rounded edges and lighter coloured areas of fatty change; microscopically the ova of *Schistosoma mansoni* were found in little fibrous nodules in which the cells had a concentric arrangement among which eosinophil cells were very noticeable and the liver appeared to be in the early stage of portal pyæmia with marked periportal infiltration with cells. The spleen though much enlarged and congested showed no abscesses.

Case 2.—A boy of thirteen years was admitted in a moribund condition with a history of night sweats for two nights. There was no jaundice. The large intestine was rather œdematous in its lower part with the rugæ prominent and reddened but showing no ulceration or polypoid condition; the ova of *Schistosoma mansoni* were found in large numbers in scrapings from this area. No ova were found in the bladder. The liver showed the presence of bilharzia ova and a few small abscesses, the biggest of which was about the size of a pea. The spleen and the left kidney, only, showed a few similar small abscesses.

Case 3.—A man of twenty-six, complaining of illness and pain in the upper part of the abdomen for three days, died after nine days in hospital having had fever of almost quartan-like periodicity; afebrile periods of about thirty-six hours being followed on four occasions by bouts of fever ranging from 101° to 104° lasting about twenty-four hours each. Blood examination only revealed a marked leucocytosis. At the post-mortem the gums were found to have a tendency to bleed, and there was a tinge of jaundice. Nothing attracted attention in the bowel. The liver had rounded edges, was much congested and microscopically showed much cellular infiltration in the portal canals and ova of *Schistosoma mansoni* were found in the characteristic nodules made up of concentric layers of cells. The spleen though weighing seventeen ounces showed only congestion and no abscesses but the kidneys showed a swollen cortex with yellowish stippling which microscopically were seen to be commencing abscesses; this condition was more marked on the left side where the kidney weighed eight and a half ounces as against the five and three quarter ounces of the right one. The bladder was healthy.

Case 4.—A girl aged ten years, from whom no history could be obtained, died within twenty-four hours of admission having shown fever ranging between 104° and 106°. There was a marked leucocytosis and a tinge of jaundice. At the post-mortem no disease of the intestine was found but the bladder showed the presence of the ova of *Schistosoma hæmatobium*. The liver which weighed forty-five ounces had scattered pale areas some like large tubercles but others rather bigger and breaking down in the centre: on microscopical examination these were small abscesses. The spleen showed an abscess on its anterior edge about the size of a cherry while in its substance were several tiny abscesses like those in the liver. Cultures taken from the spleen and liver grew *Staphylococcus aureus*.

(1) *Intestinal diseases.*—I am only mentioning the conditions which are more unusual in the natives of the tropics.

A case of appendicitis, the only case seen in the course of many post-mortem examinations; a man of forty-five who was moribund on admission. The abdominal cavity contained gas and the appendix with a gangrenous tip lay in an old retrocaecal abscess cavity which apparently had ruptured.

Two cases of perforated pyloric ulcer.

The first in a man aged thirty who was dying when admitted and gave no history except complaining of gonorrhœa, saying he was tired of native treatment for it. Free gas was present in the abdomen and a general peritonitis of about three days duration. Just beyond the pylorus on its anterior surface was an ulcerated area about three quarters of an inch in diameter and forming a pocket; at the base was a punched out ulcer about quarter inch across with very hard edges; microscopically there was no evidence of malignant disease.

The second case was also in a man aged about thirty who died on arrival at hospital. The abdominal cavity was full of stomach contents. At the pylorus on its anterior surface was a pouch about an inch across, the inner surface of which appeared to be largely scar tissue; at the base of this was a small perforation with cartilaginous-like edges; microscopically the ulcer showed no evidence of malignant disease but in the granulation tissue at its base was a well-marked increase in eosinophil cells.

(m) *Liver Diseases*.—It is almost unusual to find a liver that can be passed as normal in appearance; a palm oil diet, helminthic and other conditions seem to result in a fatty condition often arranged in irregular patches, an increase in periportal fibrosis with excess of small cell infiltration and sometimes areas of focal necrosis. Cirrhosis of the liver is a common finding but I am not sure of its commoner causation. A case of carcinoma of liver has been mentioned elsewhere.

A case of acute yellow atrophy, so called for want of a better diagnosis, occurred in a youth aged seventeen years who was admitted with a history of epigastric pain and vomiting commencing twenty-four hours previously. He looked extremely ill, was deeply jaundiced with a pulse of eighty-four and temperature of 99.6°. Vomiting occurred after admission but was watery. The blood showed no parasites but a marked leucocytosis and the serum gave a marked direct biphasic van den Berg reaction; the urine contained a thin cloud of albumen, bile, epithelial and granular casts which were bile stained and also some tyrosin crystals. The patient became gradually comatose and died about thirty-six hours after admission. A post-mortem was made eight hours after death. Icterus was evident in all the tissues and the main feature was the extraordinary condition of ecchymoses internally. No petechiæ or ecchymoses were noticed externally but ecchymoses and petechiæ were extreme in the omentum and mesentery, being scattered over the peritoneal surfaces and especially well marked where it commenced to be reflected over the bowel which itself appeared free of this condition. The lungs showed many small ecchymoses in their substance but otherwise they were normal.

The stomach showed no petechiæ externally though they were present in the mucous membrane at the cardiac end; much black material was present in the stomach. The duodenum only showed a few petechiæ but for about a third of the length of the small intestine the contents were largely altered blood. The large intestine contained grey-coloured fæcal matter. No helminths were found.

The liver weighed thirty-six ounces, was a bright yellow colour and leathery in consistence with wrinkled cut surface which showed no evidence of liver lobules. The spleen weighed twelve ounces and was firm and dark. The pancreas appeared somewhat paler than usual. The kidneys weighed seven and eight ounces respectively with pale and swollen cortex and the capsule stripped quite easily. Smears from the lungs and spleen showed no unusual organisms. Microscopically the liver shows extreme necrosis,

practically no liver cells remaining, allowing collapse and accounting for the wrinkled condition of the cut surface. The kidneys show marked fatty change in the tubules with some calcification of casts and approach the blackwater fever type of kidney. Cardiac muscle also shows marked fatty degeneration.

Some of the members of the Rockefeller Yellow Fever Commission were present at this post-mortem and I understand are not inclined to regard this as a case of yellow fever.

VII.—EXAMINATION OF TISSUES.

This is a routine matter in connection with post-mortem work of the hospital and also includes portions of tissue excised at operations.

Unfortunately the necessary apparatus did not arrive until I had accumulated a large amount of material and there has of necessity been a delay in making diagnoses while working through this accumulation but I have to thank the members of the Rockefeller Yellow Fever Commission for their very willing help in the more urgent cases.

Altogether 401 portions of tissue have been sectioned and examined; almost all portions of the body are represented in the list but portions of the liver largely outnumber the others mainly owing to the abnormal appearance of most of the livers met with.

Twenty-nine specimens have have been reserved for the museum when it materialises.

G. G. BUTLER,

Pathologist.

APPENDIX C.

REPORT OF THE TSETSE INVESTIGATION, 1926.

BY

DR. LLEWELLYN LLOYD, D.SC.—TSETSE INVESTIGATOR.



The Fence.—The pool is to the left of the picture. (Fig. 1.)



Tapkin da Fadi pool, with uncleared bush on right; cut material stacked at base of trees on left. (Fig. 2.)



Clearing at Tapkin da Fadi showing men at work. Large stack of 'Sarkakiya' thorn on right. (Fig. 3.)

REPORT OF THE TSETSE INVESTIGATORS, 1926.

During 1926 the Investigation Staff has consisted of Dr. W. B. Johnson, Director; Dr. Ll. Lloyd, Entomologist and Dr. P. H. Rawson, Medical Officer seconded as Investigator. Dr. King, who was engaged upon sleeping sickness work, had to be withdrawn early in the year but his place has now been filled by Dr. Lester. Captain Ramage, Assistant District Officer, has been attached to this investigation but is still performing his political duties in addition. In September the staff was further strengthened by the attachment of a Forestry Officer, Mr. Collier.

It is hoped next year to increase the staff as follows:—one Entomologist, to be appointed; one Medical Officer, to be seconded as Investigator; three Assistant District Officers, to be seconded to act with a Senior District Officer on clearing and settlement schemes; four sleeping sickness Medical Officers, to be attached to the investigation from the general Medical Staff to perform sleeping sickness medical work where necessary.

Laboratory and field experiments have been continued through the year, the former consisting mainly in the accumulation of statistics about the tsetse in the neighbourhood of Sherifuri where the investigation camp is situated. *G. morsitans* and *tachinoides* have been collected week by week over a period of four years from various fixed points and a record of the following varying characters has been kept:—the density of the fly as recorded by the average number which a fly-boy can catch in an hour; the female percentage in the catch; the blood supply as evidenced by the amount and character of the imbibed blood; the state of nutrition as evidenced by the amount of fat the flies contain; the rate of breeding given by recording the proportion of soft recently emerged flies; the trypanosome infection. Most of these factors show a definite seasonal rhythm and when conditions in the bush are changed by an experiment the effects of the change are reflected by an alteration in the rhythm of the variations and in this way the laboratory work serves to check the field experiments and gives a basis on which the results of change may be estimated.

Conditions have been altered in various fly foci around Sherifuri in three ways:—firstly the game has been excluded from a forest pool which is a definite focus of tsetse by means of a ring fence of wire netting; secondly in a very wild piece of bush in which tsetse abound grass burning has been postponed till late in the dry season; thirdly the effects of bush clearing are being studied. A detailed account of these experiments will be published in the *Bulletin of Entomological Research*. The results to the end of 1926 are briefly summarised here.

EXPERIMENT 1.—EXCLUSION OF GAME FROM A TSETSE FOCUS.

A wire fence (Fig. 1) three miles in length was constructed around a pool which formed a focus of *G. morsitans* and *tachinoides*. The fence was completed in February, 1925 and antelope were thereby cut off from the pool and observations on the fly have been continued over the subsequent two years. During the rains when the flies move about fairly independently of the fringing thickets the enclosed area is subject to invasion by fly on all sides but during the dry season the arid plain surrounding it isolated it from invading flies to a considerable extent except at one point where the fence comes close to an extension of the fringing bush of the main river (Katagum River). As a main road skirts the fence man and domestic animals have been liable to bring flies to the pool from the crossing of the main river a mile away. In January, 1926, the bush at this ford was cut down and in November of the same year all the fringing forest along the main river in the neighbourhood of the fence has

been cleared so that now the fenced pool is much less liable to invasion by wandering flies than it was in the first two dry seasons after the fence was built. The wire has been kept in good condition by constant replacement of the posts and has been broken into on three occasions only, once by a roan, once by Senegal hartebeeste, and once by warthog, but there has always been a duiker inside which has become so cautious in its habits that it has escaped capture. The wild animals soon learnt to avoid the spot and now rarely pass near it.

The effect of game exclusion on both species of tsetse has been pronounced. The pool is what may be described as a good secondary focus of tsetse, that is, both species were very abundant there from August to March but became scarce as the pool dried in April and again increased in numbers from June onwards. Since the fence was constructed the re-population of the fly in the rains has been most markedly retarded and instead of a density of about 100 flies per fly-boy-hour being found, the greatest density recorded for *morsitans* in the dry season 1925-26 was twenty-five and in the following dry season eighteen, while in December, 1926, isolation being now fairly complete, the density sank to six flies per boy-hour. With *tachinoides* the reduction has been less remarkable as a density of sixty-two flies was attained in November, 1925 and in the following dry season a maximum density of thirty-five was recorded, while in December, 1926, it was twenty-one.

The actual reduction in numbers is considerably greater than these figures show because the flies when hunger-stricken come more readily to man than when they are thriving and so a larger proportion of those present are caught by the nets. Since the fence was closed nearly half the *morsitans* caught have been old starving flies or young flies which had not obtained a meal whereas in the six months before the fence was constructed only about five *per cent.* were in these conditions. The direct evidence of distress in *tachinoides* is not so striking because though the proportion of starving flies has greatly increased, the proportion of young unfed flies has remained much as before. The game is the source of the trypanosomes which infect domestic stock and in spite of its exclusion the proportion of infected flies remained high, and, though there was so much evidence of hunger, the proportion of flies which contained recognisable blood did not sensibly diminish. These two anomalies are explainable only by assuming a considerable invasion of the fenced area by flies from the neighbouring main river focus, these entering in the normal state of nutrition and infection. Once inside, more or less anchored to the fringing bush of the pool, they were reduced to a state of starvation.

Tachinoides feeds readily on reptiles which the fence does not incommode and the proportion of reptile blood obtained by these flies remained much as before. *Morsitans* does not feed on reptiles but on occasion takes blood from the larger birds which are plentiful about this pool and the proportion of avian blood in this species increased after the fencing to thrice the normal, becoming nearly ten *per cent.* of the total blood imbibed. The proportion of blood of human type (estimated by the size of the red cells) in *morsitans* increased from 12.4 *per cent.* to 17.1 *per cent.* of the total recognised and in *tachinoides* from twenty-four *per cent.* to thirty-four *per cent.* It is difficult to speak with any certitude about these latter bloods. That its identification is substantially correct is shown by some recent preliminary work with precipitin tests which has confirmed that what has been called 'blood of human type' is in the great majority of cases really human. As wild animals were approaching the fence little, while traffic along the road skirting the area remained normal, a larger proportion of flies brought there would be in the company of man than was formerly the case and we are inclined to attribute the apparent increase in the proportion of blood

of human type to this factor rather than to any accommodation inside the fence. The accommodation to birds, and whatever other there may have been in the enclosed area, was insufficient to prevent a state of starvation in *morsitans* which the fly could not survive and it is evident from the data collected that if it had been possible to prevent invasion of the spot the focus would have rapidly become free of *morsitans* while the colony of *tachinoides* would have been reduced to very small proportions, dependent almost entirely upon reptiles for a food supply.

It stands to reason that since both species can obtain blood from man removal of their main normal source of food would mean that they would lose no opportunity of attacking him in their attempts to resist starvation. If *morsitans* only were to be considered this would not be a matter of great importance because the type of village in which man and this tsetse could come into intimate contact hardly exists in Northern Nigeria and it is only by intimate contact between a colony of tsetse and a settlement of man that an epidemic of sleeping sickness can develop. But *morsitans* in Nigeria never exists where one or other of the riverine species is not also present and these are dangerous to man especially when short of other food because colonies of them become established at watering places. For this reason we do not consider a policy of organised game destruction to be a wise one in this country although if successful it would lead to a disappearance of *morsitans*, a reduction in the other species, and the removal of the only source of infection of domestic stock which need be considered. At the same time we consider that any policy of game protection which tends to an increase of the antelope is a mistake because if game increases it spreads and carries *morsitans* with it. Of this fact there has just been a demonstration near Sherifuri. Owing to depopulation along the Kiyawa River, the result of epidemic sleeping sickness, game has increased on the deserted farm lands and in the last two years *morsitans* has become thoroughly established in a new primary focus along this river where formerly it was rarely seen. This gives it a much advanced starting point towards the north for its wet season spread and some large herds of cattle in Hadeija Division which were formerly comparatively safe from trypanosome infection are now endangered. Such a state of things is liable to lead to further depopulation further north and so the evil goes on spreading. Pending some other solution of the tsetse problem no effort whatever should be made to preserve game which in the presence of the fly is a most serious menace to the cattle-raising country of the north.

EXPERIMENT 2.—DEFERRED GRASS BURNING.

A successful experiment in late grass burning was carried out in an uninhabited piece of bush some twenty square miles in extent. It was bordered along one side by the Katagum River with its heavy fringing forest and thickets of great width in which *morsitans* and *tachinoides* abound. Under normal conditions the various grasses of this area are ready for firing at three distinct times. The short grass on the arid ground burns soon after the rains cease in September or October; the general long wiry grass of the forest is ready to burn in December; the long grasses of the depressions are not dry till March. In the present year the whole was fired in April on a day when a strong wind was blowing and a fire of unusual severity resulted which consumed all the grass and the carpet of vegetable debris in the thickets. The effect of this fire on the established thicket was negligible but isolated thicket elements growing in long grass were killed to the ground and had to recommence growth from the base. It seems possible that annual late grass fires might prevent the spread of thicket or its formation on abandoned farm lands but little is to be hoped from them in destroying thickets well established around forest trees.

The effect on the tsetse was of interest. Before the fire the apparent density of *morsitans* was forty-nine but this figure was low because of the difficulty of catching the flies in the tangled grass and a fair figure would have been in the neighbourhood of 100; among these 11.6 *per cent.* of the flies had recently emerged from the pupae. The day after the fire the density had fallen to thirty-four though there was now no difficulty in catching and the proportion of recently emerged flies had sunk to six *per cent.* These figures show without doubt a great mortality among flies and pupae. A month after the fire the density had increased to seventy-nine (it was 130 on the river bank in the previous year at this season so the figure is still low) and the proportion of young flies was 1.3 *per cent.* The flies were thriving well.

Before the fire the density of *tachinoides* was 115, there being no difficulty in catching these flies in the glades where this species ranges, and the proportion of young flies was thirty-seven *per cent.* The second day after the fire the density had sunk to thirty-one and the proportion of young flies had risen to sixty *per cent.*, an increase in proportion only for the reduction in old flies was as 72:12 and that of recently emerged ones as 42:19. A month after the fire the density had increased to seventy-four and the proportion of young flies was fourteen *per cent.*, a remarkable reduction.

The recovery in numbers was due less to breeding than to invasion from neighbouring fly foci and an annual mortality of the flies such as that which occurred in this instance, if induced through the whole of a fly belt, would be a great shock to the insects. The immediate result, however, was disappointing when compared with the success of similar experiments carried out in East Africa by Swynnerton. The difference we attribute to the fact that the thicket of Northern Nigeria is of much more massive growth than that with which Swynnerton dealt and it may be that the uneven nature of the grasses has also made a difference for the large patches of short grass which interdigitate among that of longer growth burn off like fluff and on the arid ground there are numerous tamarind trees which are only just scorched by such a transient fire and in the shade of these fly would be unharmed.

Experiment is being continued along these lines in the same piece of bush and in a second area of reverted farm land but we are not hopeful that a system of deferred grass burning could be a high road to success in Nigeria. It was generally agreed at the Kaduna Tsetse Conference that without depopulation the preservation of large areas of grass was a matter of the greatest difficulty. The country is full of nomads, cattle grazers, hunters and honey collectors, who are all eager for early burning. Also if late burning is made an annual practice erosion and impoverishment of the soil and grazing result.

EXPERIMENT 3.—CLEARINGS.

Clearing has for long been known as a remedy against tsetse. If the shade is removed or suitably qualified the flies rapidly disappear. Our view is that in the wetter southern parts of the country at present clearings should be of a protective nature only (to safeguard stations, ferries, etc.), as the cost of attempting to eradicate the pest, which is almost universally distributed there, would be prohibitive. In the drier northern and eastern parts infested with *G. tachinoides* and *morsitans* there is evidence of a spread of the latter fly which is likely to become a serious menace to this cattle-raising country but there is some hope of being able to reclaim the areas now infested because they are still relatively a small part of the country and regrowth of the bush is far less rapid where the rainfall is low.



Clearing on Kiyawa river. Men at work in heavy thicket above the bank. Typical thicket clothed in Sarkakiya thorn. In centre trunk of tree exposed for cutting or stacking. (Fig. 4.)



Clearing on bank of Kiyawa river, chiefly 'malmo' trees. Men at work on bank. Note the overhung condition of the water. (Fig. 5.)



Eastern Pool, primary focus of *morsitans* and *tachinoides*. Bush cut at back; fish drive in progress. (Fig. 6.)

The experimental clearing work commenced last dry season at Sherifuri aimed at cutting across a belt of *morsitans* and *tachinoides* which intervenes between two cattle areas and is extending towards Kano and Hadeija Divisions and it is proposed to extend this clearing combined with farming settlement of the cleared area. Clearing last dry season has made the road between Azare and Hadeija practically tsetse-free in the dry season but is insufficient to cope with the wet season spread. We are attacking the actual foci in which the flies breed and from which they extend in the rains and are not cutting down to any great extent the general forest apart from the fringing bush. If this method is successful the eradication of tsetse in the drier northern parts will be a practicable measure, though costly. Considerable expenditure is justified because the eradication of the fly will not only make the richer lands available for farming but will also give to the cattle people good grazing and surface water in the dry season which they at present lack and so should prevent in part the great annual cattle treks to the south in search of sustenance for the stock. The cattle migration makes the task of the Veterinary Department more difficult as it must disseminate diseases of stock, other than trypanosomiasis and it also interferes with the work of the Administrative Officers.

In massive clearing two great difficulties are met with,—a supply of labour and suitable tools. The latter difficulty seems to be overcome by the adoption of the 'pick-eyed' axe for the main weapon as it is much stronger than the woodman's axe and can be refitted locally when the handle breaks. As regards the labour, last season, gangs of men called up by the Emir were chiefly relied on though a fair number of volunteers also came in. This season the number of men who have come and offered themselves cheerfully for the work has greatly increased and it is hoped that soon it may be possible to rely entirely on this excellent type of labour. Either class of labour, however, is available only when there is no farming work to be done and from the time when farming operations begin in April until October few men are to be had and of course no attempt is made to persuade them from their farms. For two months at each end of this period the bush is in a suitable condition for work and it is proposed to test the possibility of continuing the work with the aid of machines.

Clearing is only the first part of the reclamation of the infested lands. Unless they can be settled they will necessarily revert to tsetse-haunted bush in time. Every inducement is being offered to settlers to take up the cleared areas and the Administrative Officer is hopeful that an influx of settlers will shortly come in. Already it has been found safe to make a settlement in what was a couple of years ago a very heavily infested piece of forest but is now an extensive farm.

Some photographs illustrating the clearing work are given.

Fig. 6 shows a deep permanent forest pool which formed a primary focus of *G. morsitans* (density up to 130 flies per boy-hour) and *tachinoides* (density up to 100 flies per boy-hour); the men are engaged in their annual fish drive in which they came into close contact with tsetse; the fringing bush in the background is cut but not yet burnt. Since it was burnt the bank has become clothed in loofah and other creepers which do not harbour tsetse. In the dry season it is now practically tsetse-free but the flies still invade the general forest beyond in the wet season spread from foci not yet dealt with.

Figs. 2 and 3 show the clearing in progress at a forest pool which abuts on extensive farm land deserted on account of sleeping sickness. The masses of creeper can be seen stacked over the stumps where the material is left to dry before firing. The pool is now tsetse-free, the old thickets being replaced by prone creepers.

Fig. 4 shows men at work in typical heavy thicket above the bank of the Kiyawa River which for many miles has been depopulated by sleeping sickness.

Fig. 5 shows the clearing work on the bank of the same stream and illustrates the manner in which the evergreen shade overhung the water. The trees are mostly 'malmo' (*Eugenia owariensis*) which on this stream is the most pernicious shelter of *tachinoides*. The timber of this tree dries rapidly and if stacked over the stumps can be burnt two months after cutting when the trees which are not fire resisting are completely killed. Four miles of this stream straddling the main road were dealt with last season and the neighbouring land is now safe for settlement as no tsetse is to be found there.

APPENDIX D.

ANNUAL REPORT ON X-RAY DEPARTMENT

BY

DR. H. H. STEWART—*Specialist.*

X RAY DEPARTMENT, LAGOS.

The total number of cases examined by X rays during the year under review was 432.

In the majority of cases fractures were the reason for examination. The proportion of fractures to other conditions would appear to be high when compared with English hospitals, though in this connection no accurate figures are available. The reason for the foregoing may on the one hand be the alleged immunity of the native from tumours and on the other the crowded and dangerous state of the Lagos streets.

2. The apparatus has given but little trouble during the year and the benefits of a three phase current are very real. The progress, however, in apparatus and auxiliary devices is so rapid in these days that equipment purchased in 1919 may already be considered as quite out of date. The present vertical screening stand is a case in point and if the volume of the work increases further it will have to be replaced, for it cannot be considered safe for the operator.

3. I have already remarked in another report to you that the available space is now most unpleasantly crowded with apparatus and it will not be possible to extend the scope of the treatment section till the new hospital buildings are available.

4. There is little of interest to report regarding the above enumerated diagnostic examinations; the majority of them are of course purely routine.

An interesting observation has, however, been made with regard to the position of the stomach in Europeans. It has frequently been observed during examinations with the aid of an opaque meal that in Europeans the stomach level is much lower than normal. The condition is not, however, severe enough to be classed as pathological but raises the question as to whether much of the so-called "dyspepsia" and allied conditions may not be due to this cause. Further observations extending over a much longer series of cases is required and it is hoped to do this at an early date.

One interesting case of complete ptosis of the colon was met with and is being reported elsewhere.

5. Turning to the treatment side, a complete though not very powerful, ultra violet light installation was acquired at the beginning of the year.

An extensive trial in various conditions will be necessary before we can determine its value in the treatment of tropical ailments.

A beginning has been made, however, with a series of ulcer cases which are still under treatment.

The results so far are not at all conclusive. In some cases rapid healing would appear to begin after some three or four exposures and then but little progress is apparent. The curiosity of the native is also a factor to be taken into account for he will, unless closely watched, frequently examine or bathe in water his ulcer so that repeated infection is the rule.

However the treatment is sufficiently promising to warrant prolonged investigation before coming to any definite conclusion.

The ultra violet content of sun light is very high where there is little water vapour in the air; this condition is, of course, fulfilled in the Northern Provinces and it would be interesting to test the results of systematic exposure of ulcers, the number and lengths of exposure being carefully noted in selected cases.

6. The diathermy treatment continues to prove most useful in joint and allied affections.

Continuous current treatment would appear to be of great value in early cases of localised neuritis but the number of cases treated have not allowed of a lengthy trial of this remedy.

7. The total number of treatments during the year was 556 and it is hoped to increase this number as diseases responsive to electrical treatment are investigated.

It must be noted, however, that the plague epidemic caused towards the end of the year a marked diminution in the numbers of patients attending the hospital and in consequence a falling off in cases suitable for electrical treatment, as the majority of cases treated in this Department are drawn from those seeking relief either as in- or out-patients of this hospital.

8. I was absent on leave from March to August, and was relieved by Dr. A. Robertson to whom I am indebted for carrying on investigations with ultra violet light.

H. H. STEWART,
Specialist.

APPENDIX E.

ANNUAL REPORT ON THE PLAGUE IN NIGERIA FOR THE
YEAR ENDING 31ST DECEMBER, 1926,

BY

DR. ALLAN—SENIOR SANITARY OFFICER.



View of Docemo Street, Lagos, where a Number of Plague Cases have been Found, showing Dilapidated, Congested and Insanitary Buildings and Street Trading.



House at Oke Suna Street, Lagos, where over fifty Rodents were Caught in the Roof.

(Impossible to Deal with except by Demolition.)

REPORT ON PLAGUE IN NIGERIA FOR THE YEAR ENDING 31st DECEMBER, 1926.

SHORT HISTORY OF PLAGUE IN NIGERIA.

Plague was first discovered in Nigeria in the month of July, 1924, in the Oko Awo area of Lagos Island. It is supposed to have been introduced from the Gold Coast by infected fleas contained in the personal belongings of the servants of kola traders or in the sack-
ing used for covering the kola bundles. It was not considered likely that a rat infection had existed very long before the human cases appeared, but as early as August, 1924, the rat infection had risen to nearly 4.5 *per cent*. The total number of cases in 1924 was 414, October being the worst month with 259 cases. In 1925 the total cases numbered 116 with a low rat infection which rose at the end of the year to 2.37 *per cent*. Twelve cases were reported at Agege on the railway and a history of a number of suspicious deaths was received from a small village Kurere. In August, 1925, a considerable outbreak (which still continues) was reported from Ijebu-Ode Province about thirty miles east of the railway. This involved a group of villages three to five miles apart and over 500 cases were reported. In November, 1925, an outbreak with forty-four deaths was reported from Abeokuta. This outbreak was very localised and appears to have stopped suddenly.

PLAGUE FIGURES FOR LAGOS, 1926.

The total number of cases reported during the year was 497 of which ninety-eight were admitted to the Infectious Diseases Hospital. All except three were reported from Lagos Island, west of MacGregor Canal: one was reported from the Hausa Settlement at Ikoyi in April and two from Ebute Metta in October. The worst areas to be affected were Ereko, Oko Awo and Faji, which represent three of the most insanitary districts in Lagos.

In this connection an attempt was made to arrive at the density of population in certain crowded areas in Lagos for comparison with the population of certain towns in India. Two areas were taken in which plague infection had been general throughout the year, *viz* :—

- (i) Area bounded by Palm Church Street, Isalegangan Street, Victoria Street and Araloya Street = $11\frac{1}{2}$ acres with a population of 2,246 giving a density of 200 per acre.
- (ii) Area bounded by Martins Street, Broad Street and Balogun Street = $13\frac{1}{2}$ acres with a population of 1,859 giving a density of 143 per acre.

In a census taken of the population in Cawnpore, 1911, the average density of population of six congested areas where plague was general was given as 200 per acre, the numbers varying from 153 per acre in one area to 265 per acre in the most crowded quarter of the town.

A few cases of plague occurred between Broad Street and the Marina but this area has remained comparatively free.

One case (bubonic) which recovered was reported from the Prison. It is difficult to say how he had been infected. He had been in the Prison for twelve months, but was one of a sanitary gang which worked in the town. No other cases occurred.

As the percentage of rat-infection rose at the end of 1925, it was expected that there would be an increase in the number of cases early in 1926. This in fact did happen, the number of cases for January being nineteen, February twenty-four, and March twenty-

one. The numbers dropped in April and May, but rose in June and kept rising until October when the peak was reached. The numbers then dropped quickly and remained fairly low until the end of the year.

The monthly figures are as follows:—

			Cases.	Deaths.				Cases.	Deaths.
January	...	...	19	18	July	...	...	20	20
February	...	...	24	23	August	...	...	61	59
March	...	...	21	16	September	...	...	108	106
April	...	...	6	4	October	...	...	144	139
May	...	...	7	5	November	...	...	43	43
June	...	...	17	16	December	...	...	27	27

DEATH RETURNS.

The total deaths from all causes reported in Lagos and Ebute Metta for 1926 was 3,054, compared with 2,510 in 1923, 3,265 in 1924 and 2,748 in 1925. The number has been highest in the two worst plague years, *viz*:—1924 and 1926. As there had been a considerable increase in the number of deaths reported as being due to respiratory diseases in 1924 it was considered very likely that a number of plague cases were being missed. On the 16th August, 1926, therefore, pneumonia was made a notifiable disease under the Public Health Ordinance, and it was decided that post-mortem examination should be carried out in every case where there was a suspicion of plague, whether the cause of death has been certified by a medical officer or not.

The comparison of the figure “deaths due to respiratory diseases” is interesting for the four years. In 1923, a non-plague year, the total number reported was 804 of which eighty-seven occurred in December. In 1924 the number reported was 953 of which 104 occurred in August, 107 in October and 115 in December. In 1925 (a mild plague year), the figure was 733, the highest number being ninety in August. In 1926 (a bad plague year but with pneumonia a notifiable disease) the number was 646 the highest month being October with seventy-two.

It would appear as if a certain number of deaths from plague in 1924 and 1925 had been reported as due to other causes.

Chart No. 1 shows the comparison.

TYPE OF DISEASES.

Of the 497 cases reported 44.5 *per cent.* were bubonic, 48.7 *per cent.* septicaemic and 6.8 *per cent.* pneumonic. The bubonic type was most common at the beginning of the year and septicaemic during the months of October and November. Pneumonic cases were reported during the year but were most numerous during the month of October when sixteen cases were reported. The condition in many cases was exceedingly difficult to diagnose and a few were admitted to the African Hospital as cases of non-plague lung affections.

The Surgical Specialist (Dr. Parkinson) and three African nurses were most unfortunately infected supposed to be from one case diagnosed and admitted as lobar pneumonia on 15th October. Since then, every case that arrives for admission to the African Hospital where there is any suspicion of plague, is referred to the Infectious Diseases Hospital for observation. Even with this precaution it is possible for the Medical Officer to be caught unawares.

The Medical Officer on Plague Duty reports as follows on conditions found at the autopsy at the Public Mortuary:—

“ Primary buboes, showed periglandular infiltration, the gland showing a variable amount of minute haemorrhages.”

“ Out of 191 Bubonic Cases the Femoral glands were affected in 76·9%

“ Out Inguinal 10·9%

“ Out Axillary 8·8%

“ Out Cervical 2 %

“ Out Sub-Maxillary ·7%

“ Out Epitrochlear ·7%

“ *Spleen* was invariably enlarged and congested, and in some cases haemorrhagic.

“ *Liver*.— Often congested but not enlarged as a rule.

“ *Lungs*.—Out of 396 bubonic and septicaemic cases, 126 showed lung complications either broncho-pneumonic or infarcts.”

In pure pneumonic cases (*i.e.*, with no enlarged or haemorrhagic glands and no bacilli in the spleen) two conditions were noted.

“ (a) Intense congestion of lung with large haemorrhagic patches, but no consolidation.

“ (b) Consolidation of one lobe of one lung with the other lung normal.”

INFECTIOUS DISEASES HOSPITAL.

Ninety-eight cases of plague were admitted to the Infectious Diseases Hospital: sixty-seven bubonic, nineteen pneumonic and twelve septicaemic. The pneumonic and septicaemic cases all died but twenty-three of the bubonic cases recovered.

The Medical Officer in charge gives a brief description of the symptoms as follows:—

“ All the cases complained of severe headache, especially frontal, with high fever and extreme weakness. Pain at the site of the bubo always present and sometimes intense. The features usually drawn and haggard with dullness of mental faculties.

“ Temperature high and pulse fast except in mild bubonic cases.”

“ Vomiting frequent.

“ Skin hot and dry. Spleen enlarged and tender.

“ Conjunctival jaundice was not uncommon.

“ Two cases admitted showed skin eruption.

“ (1) Papular containing serum and *B. pestis*.

“ (2) Pemphigoid containing serum and *B. pestis*.”

The types of cases seen are described as follows:—

“ I.—BUBONIC.

“ (a) Mild cases or *pestis minor*. Three cases were admitted. Patients looked extremely well, the constitutional disturbances being slight. The temperature did not go above 101° F. Two had femoral buboes and one axillary. Diagnosis was made by gland puncture and these cases made an uneventful recovery.

“ (b) Ordinary type with severe constitutional disturbances. This includes the majority of cases admitted. A feature was the large number with lung complications either broncho-pneumonia or infarcts. Cases had usually a slight cough with a very small amount of sputum.”

“ II.—SEPTICAEMIC.

“ Only a few cases were admitted to the Infectious Diseases Hospital. Cases were very collapsed, death taking place in a few days. No definite clinical signs were observed, except a very high temperature and signs of severe toxæmia.

“ III.—PNEUMONIC.

“ (a) Acute type. In most of these cases nothing definite can be made out of the lungs. Headache, pain in the chest and cough complained of. Cough small and suppressed with sputum scanty and frothy at first and later abundant, watery and tinged with blood. The temperature ranging from 104° F. to 105° F., death taking place within two days. Consolidation of lung slight.

“ (b) Chronic type presents the features of an ordinary pneumonia and it is impossible to give a diagnosis within the first few days unless a positive sputum is obtained—cases do not appear so ill as the previous type. Cough is more evident with scanty sputum. Temperatures range from 102° F. to 104° F., and some of the cases live for seven to eight days. The clinical picture is more of a lobar pneumonia. These cases do not appear to be so infectious as the acute type but this does not always obtain as the case which started the outbreak of pneumonic at the African Hospital had grey hepatisation of one lobe.

“ *Treatment.*—It did not appear as if any treatment tried was very effective, although anti-plague serum and mercurochrome seemed to do good in some cases. Mercuric chloride and iodine were found to be of little value.”

In connection with the work of Dr. d'Herelle on the treatment of plague by a bacteriophage the Director of Medical Research, Yaba, wrote to Dr. Herelle at Alexandria asking for particulars regarding the bacteriophage culture but so far no reply has been received.

RAT INFECTION.

Examination of rats for evidence of infection was carried out under the direction of the Director of Medical Research. The rat infection in Lagos varied between the lowest of .4 *per cent.* (April), and 2.7 *per cent.* (March), until the end of August when it commenced to rise reaching six *per cent.* in September and 6.5 *per cent.* in October. It then dropped quickly and varied between two *per cent.* and three *per cent.* for the months of November and December.

Chart No. 2 shows the close relationship between the rat infection and plague incidence.

Investigation was made into the question of mouse infection and was found to be just above 0.02 *per cent.* out of 15,989 mice examined.

In 1924 the percentage of infected rats rose as high as five *per cent.* in October and gradually came down almost to zero in December. In 1925 the highest point of infection reached was 2.3 *per cent.* in December.

During the current year infected rats have been found in Lagos Island, Iddo, Ebute Metta and Apapa.

Rat infection has been general over Lagos Island except in the European residential quarters at Ikoyi. The highest infection has been reported from the congested and insanitary areas of the town, and there has been a close relationship between the locality of plague cases and infected rats. No infected rats have been reported from



Yard in Oke Suna Street, Lagos, showing Thatched Roofs and Bamboo Walls.

(Impossible to deal with Buildings except by Demolition.)



A View showing Street Trading in Foodstuffs at the Corner of Idunmata Street and Victoria Street, Lagos.

(The Picture indicates the Necessity for Proper Sanitary Markets.)

between Broad Street and the Marina. A large number were brought into the rat stations by the public and their place of origin is not revealed. Four have been reported from Iddo Island near the Railway Station and the adjacent market and one from the bungalow of a European Customs official. (This bungalow which is an old wooden one has been recommended for demolition). Two have been reported from Apapa—one from the Customs Shed and the other from the Marine Dockyard. Two were reported from native houses at Ebute Metta.

The report of the Director of Medical Research shows a close relationship between the seasonal variation of the rat infection, the seasonal variation of the plague incidence and the seasonal variation in the flea infestation of the rat.

In the deratting of premises a number of mummified skeletons of rats have been found. They have been of no practical value for bacteriological examination, but are important as showing that rats have been dying in the houses for sometime back. They have usually been found between the outer wall and inner bamboo lining and occasionally in rat runs.

One dead cat found in the attic of one house was examined and found to be plague infected.

In regard to the examination of infected rats the Director of Medical Research reports frequent intestinal haemorrhages with plague bacilli in infected rats. His experiments which suggest a possible connection between this condition and the spread of plague may prove of very great importance in relation to the aetiology and epidemiology of pneumonic plague.

Of the total rats examined (45,749), infection was found in 2.4 *per cent.* of black rats, 2.3 *per cent.* of brown rats and .06 *per cent.* shrews.

RODENT DESTRUCTION.

This has been carried out intensively during the year. The destruction of rats is no easy matter in a town so insanitary as Lagos, where food is plentiful, and places for concealment and breeding numerous.

Rats were either caught in traps by the rat catchers or brought in by the general public receiving payment of twopence per rat and one penny per mouse. The break back trap was found the most useful.

During the earlier months of the year the rodents purchased greatly exceeded the number caught by the plague gangs, but during the later months the numbers were reversed, although there was no very marked increase in the number caught but a diminution in the numbers brought in for payment. This is probably due to the more intensive deratting and disinfection of houses.

The total number of rodents caught during the year was 162,353 compared with 180,541 last year showing a reduction of 18,188, in spite of the fact that the rat-catching staff has been increased. The rats are possibly becoming more cunning and difficult to catch, but it might be inferred that there has been a reduction in the rat population in Lagos either due to routine destruction or to plague infection. Out of 45,749 rats caught, 38,827 were *R. rattus*, 4,003 *R. norvegicus* and 2,919 Shrews. A specimen of the "pouched" rat (*Cricetomys gambianus*) was dissected.

In the deratting of the yam and corn market at Iddo over 500 rats were caught and it is an interesting point that the numbers of *R. rattus* and *R. norvegicus* were practically the same, and living under the same conditions.

Rat poisons including strychnine, phosphorus, arsenic, vermin exterminator (phosphorus) have been used on a large scale, but it is impossible to say what the results are. Vaccines have also been used. Rat varnish is being tried.

TREATMENT OF PLAGUE-INFECTED HOUSES.

It was usual during the earlier part of the year for each house in which a plague case was discovered to be demolished after disinfection and deratting. The wall and floors were first sprayed with kerosene emulsion and rat destruction was carried out. The house was then inspected by the Health Officer and if considered insanitary was recommended for demolition. One hundred and twenty-one houses were demolished during the year and £4,589 was paid in compensation. Demolition of infected houses was discontinued after July, 1926. Action in regard to rat-infected houses was commenced after June.

Isolation of Contacts was carried out as a routine measure up to July, but was subsequently discontinued except in the case of pneumonic cases.

Anti-Plague Inoculation was carried out as a prophylactic measure during the first half of the year especially in schools. It was stopped as a prophylactic measure in July after which contacts only were dealt with. 15,778 persons were inoculated during the year with anti-plague vaccine exclusive of those inoculated by the Port Health Authority.

PREVENTION OF EXPORTATION BY SHIP, CANOE AND ROAD.

In May, 1926, a new Quarantine Ordinance was passed which provides for and regulates the imposition of quarantine, and makes other provisions for preventing the introduction into, and spread in Nigeria, and the transmission from Nigeria of dangerous infectious diseases whether quarantine has been declared or not.

Under the previous Quarantine Ordinance, the Regulations could not be enforced until quarantine had been imposed.

PORT HEALTH ORGANISATION.

From January till August all outgoing deck passengers were examined and disinfected. From August (when the number of plague cases began to increase) until the end of the year deck and third-class passengers were kept under observation at the Quarantine Station for five days previous to embarkation, and their clothing and baggage disinfected. African saloon passengers were kept under surveillance.

16,303 inoculations against plague were carried out. 713 passengers were kept under surveillance and 2,638 under observation.

The question of keeping down rat communication between ship and shore is one of some difficulty and it is recognised that it is necessary to continue this with frequent fumigation combined with trapping and microscopical examination of rat-smears. The periodical fumigation of craft was carried out as often as the inadequate equipment would permit. When the new fumigation barge arrives, it is hoped to fumigate all coasting vessels as a routine measure.

Six ocean-going steamers and forty local craft were fumigated.

The question of effectively fending off vessels from the wharves has not been satisfactorily settled as apparently with the present condition of the wharves and jetties it would be impossible and the expense would be very great.

Under the New International Sanitary Convention the old and wasteful method of fumigating a ship periodically whether or not there are rats on board disappears. By its provisions the duty is placed on the shipowner to keep the vessel rat free and if when a rat survey is made no rats are found, fumigation need not be carried out.

The Port Health Staff was increased and an intensive anti-rat campaign was commenced. 2,688 rodents were caught by trapping at wharves, foreshore and harbour craft. Six of the rats caught on land were found to be infected.

One case of plague in a Kroo-boy was removed from the s.s. *Touareg*. The crew's quarters and the sick bay were fumigated, the crew examined and inoculated against plague. Nine rats were caught on board, none of which were found to be infected. It is impossible to say where the Kroo-boy got his infection. The ship last visited Lagos in June.

REGULATION OF CANOE TRAFFIC.

This has been attempted during the year but is a matter of extreme difficulty. On account of the vast importation of foodstuffs and produce into Lagos across the lagoon the canoe traffic is very great. The points at which canoes leave the island are limited to four but it was found that on certain market days the traffic at one point was so great that it was found impossible with the staff available to regulate it. At one point, *viz.*, Idunmagbo where canoes leave for Epe and Ejirin on the mainland, over twenty canoes each carrying between fifty and sixty passengers were counted leaving in one afternoon.

Further action is being taken to deal with the traffic on big market days, and amending regulations are under consideration for the better control of canoe traffic.

After the passengers, luggage and canoes have been examined and dealt with, the owner of the canoe is given a pass which must be shown on demand to the water police and arrangements are being made for the canoes to be examined on arrival at the main points on the north side of the lagoon. Canoes are only supposed to leave during day light, and European night patrols have been instituted around the Marina and foreshore to see that this is being carried out.

REGULATION OF ROAD TRAFFIC.

This consists of an inspection post at Denton Bridge which is in operation night and day. All cars and motor lorries are examined for sick people and any very obviously dirty or flea-infected clothing is sprayed with kerosene emulsion. This is all that can be attempted as the number of motor cars and lorries passing the post at times exceeds two per minute. Two cases of plague were discovered in motor cars at this post.

RAILWAY TRAFFIC.

All railway native passengers by train are scrutinised and any obviously sick person stopped. Broken packages are opened up and examined for rats. On account of plague-infected rats having been found in Iddo Station, precautions have been taken to render the sheds as far as possible rat-proof, and a rat catcher is employed specially to trap in this area.

VISIT OF SIR E. N. THORNTON.

During the year Sir E. N. Thornton, who was the South African member of League of Nations Study Party, was requested by the Nigerian Government to examine into the incidence of plague

and to report on the most effective method of dealing with it. His report which was submitted in July and the recommendations contained therein have had an important bearing on the anti-plague measures in Lagos and the mainland.

As a result of his report a separate Plague Organisation has been set up both in Lagos and the mainland accompanied by an intensive deratting and disinfecting campaign. A Senior Sanitary Officer has been detailed to be in charge of all anti-plague operations in Lagos and the mainland and a Plague Office has been inaugurated at 207, Igbohere Road.

Sir Edward Thornton's main recommendation in regard to Lagos was that premises on the island should be systematically deratted and disinfected. This recommendation has been given effect to, and deratting and disinfection on an intensive scale was begun in Lagos on 1st December, 1926. After a preliminary survey of the land and premises to the east of the MacGregor Canal and as no infected rats were found there, twelve gangs, each under European supervision, commenced operations on the west side of the Canal.

Procedure adopted.—Before anything at all is done a letter informing the owner or occupier that the Plague Staff desires to derat and disinfect the premises on a certain date is delivered at each house. This appears to gain the goodwill of the people who have been very willing to assist. Hand bills have also been distributed throughout the town.

In deratting a house the general routine is as follows :—

The house and grounds in the vicinity are explored. The house is then trapped and baited with poison for at least two days after which all rubbish is cleared away and the contents of the yard and out-buildings stacked to facilitate inspection in future and to prevent harbourage for rats. The floor of the house and the walls for two to three feet are sprayed with kerosene emulsion one in twenty and the rest of the house with 1 in 2,000 corrosive sublimate. All rat runs are either opened up and sprayed with kerosene emulsion if in mud floors or gassed with "Capex" cartridges, if in concrete walls or floors. The fumes from the "Capex" cartridge have been found both in South Africa and here to be extremely lethal to rats and fleas. It is a very light gas with great penetration. Another gassing agent is the "Hora" cartridge, a German preparation which is also very effective in regard to rats and fleas. It is manufactured by the Deutschen Gessellschaft, Hamburg. Holes in cement walls or floors are then filled up with broken glass, and closed with cement. Ceilings and spaces between double walls or partitions are explored and treated if considered to be a harbourage for rats. When the house has been disinfected and deratted, it is left for two days and then inspected for evidence of re-infestation.

It is difficult to derat and disinfect premises in some cases without complete demolition. In the worst instances demolition is carried out through the ordinary channels by dealing with them as nuisances under the Public Health Ordinance. Houses which have an outer lining of bamboo or galvanised iron and an inner lining of bamboo are also dealt with as nuisances.

The problem of enclosed spaces between the walls and the lining is one of the most difficult which has been met with so far in the deratting scheme. In many cases where they have been opened up and explored, dead rats in various stages of decay have been discovered and it is quite possible for infection to exist there for some time. All such spaces are sprayed and fumigated, and if possible done away with.

Thatched roofs are abolished.



General View of Idoluwo Street, Lagos, a Noted Plague Area, showing Dilapidated and Insanitary Buildings, Galvanized Iron Walls with Inner Bamboo Linings, the spaces between which frequently Harbour Rodents.



View from Carter Bridge, showing Site Congestion at Ebute Ero (Lagos).

Many rooms in houses in Lagos have no outside wall and no means of ventilation or lighting other than the door. They are being dealt with.

Sir E. N. Thornton in his report on Plague in Lagos is extremely optimistic of the success of the intensive deratting and disinfecting "drive" recommended in his report. One does not wish to be unnecessarily pessimistic, but the difficulties to be overcome in a town such as Lagos before success can be attained are very great and must be realised. The overcrowding and congestion both of plots and houses, along with the general insanitary conditions and the unlimited food supply for rodents cannot but impress one with the tremendous obstacles to be overcome.

The experience of plague workers in Egypt and in Japan and of the Plague Research Commission in India is not encouraging and one would point out the findings of Doctors J. Harvey-Pirie and Ingram in South Africa who showed that an animal burrow may remain infective for at least four months. The question of how infection persisted could not be answered.

It is fully realised that to make the scheme a success the whole-hearted co-operation of the public is necessary, and during the Municipal Health Week lectures on plague were given and the dangers from rats and fleas specially emphasised.

METEOROLOGICAL CONDITIONS IN LAGOS AND INFLUENCE ON PLAGUE INCIDENCE.

It has been the general experience in plague-infected countries that the disease is a seasonal one and certain meteorological factors seem to favour or inhibit the spread.

Throughout the year there were two periods of low plague incidence which corresponded very closely to the period of low infection in rats and to periods of a high mean temperature and a high Saturation Deficiency (by saturation deficiency is meant the difference between the actual tension of aqueous vapour present in the atmosphere at the temperature in question and the tension of aqueous vapour present in a saturated atmosphere at the same temperature).

As seen in Chart 3 there was in 1926 a decrease in the number of cases from the middle of March to the middle of June. This coincides with a rise in the saturation deficiency of .34 of an inch in March gradually falling to .14 of an inch in June. For the same time the mean temperature did not fall below 80° F. until the end of June.

The other decrease was for the last two months of the year when the cases fell from forty-one for the week ending 21st October, to nine for the week ending 11th November. This fall was accompanied by a rise in the saturation deficiency from .12 of an inch at the end of September to .31 of an inch in November. The fall in the plague incidence for the last two months in the year has been accompanied by a rise in the mean temperature from 78° F. at the end of September to over 80° F. in November which rise continued until the end of the year.

There was a marked decrease in the rat infection during the period. The Director of Medical Research also reported a very great diminution in the number of fleas discovered per rat for the last two months of the year.

It would appear, therefore, that all the year round the optimum conditions for the spread of plague do not exist in Lagos and that during certain seasons especially from November till possibly

June, the conditions of temperature and humidity are not such as to favour the spread of plague, possibly by limiting the breeding and development of the rat flea and diminishing the chances of the survival of the unfed adult.

The 1926 figures would tend to show that the meteorological conditions affecting the plague incidence in Lagos are much the same as those described by the Indian Plague Commission and plague workers in Egypt.

In Lagos, plague seems to be at its maximum when the saturation deficiency is below .2 of an inch and the mean temperature is below 80° F. and decreases as the saturation deficiency and mean temperature rises.

The findings of the Indian Plague Commission show that "plague does not maintain itself in epidemic form when the temperature rises over 80° F. accompanied by a saturation deficiency of .3 of an inch.

The Egyptian workers concluded:—

- (1) That for *X. cheopis*, temperatures from 20° C. to 25° C. and vapour pressure deficiency of one to ten millibars (1 millibar = .0295 inches of mercury), are most suitable for its development in all stages; and
- (2) That the higher the temperature and the vapour pressure deficiency the shorter is the period of survival of adult fleas when they are kept unfed.

The predominant rat fleas in Lagos are *Xenopsylla cheopis* and *Xenopsylla braziliensis*.

PLAGUE ON THE MAINLAND.

Ijebu-Ode.—The original outbreak of plague on the mainland occurred in the Remo District of the Ijebu-Ode Province during 1925 and had practically disappeared before the beginning of 1926. A fresh and more severe outbreak made its appearance in the first week in March in Ijebu-Ode itself and gradually spread to the northern and north-eastern districts in the villages of Oru, Ago, Ijebu-Igbo and to the west central districts in the villages of Idowa and Ososa.

At the beginning of the year three Medical Officers were stationed at Iperu dealing with the outbreak of plague in the Remo District. On account of the decrease in the number of cases they were all withdrawn before the middle of February.

In October, a Medical Officer was sent to Oru and another to Ijebu-Ode to take charge of the plague work in the northern part and the remainder of this Province respectively. These officers were relieved in early December by three Royal Army Medical Corps Officers with a staff of ten Rodent Inspectors. The Senior Officer, Major Price, is in control of the plague work in this Province and the divisions of Ibadan, Abeokuta and Epe.

The measures taken since March when the fresh outbreak occurred have been confined chiefly to the disinfection of houses in which plague cases have occurred; the disinfestation of contacts and the diagnosis of reported cases.

A more systematic campaign became possible in the middle of December when the thorough deratting and disinfecting house to house of Ijebu-Ode town commenced. Certain rules were made by the Awujale with a view to checking the carrying of infection from one town to another and the Ibadan road was closed by order of the Oyo Authorities. At the end of October the road was opened to persons who had been inoculated, on their undergoing a disinfestation process at the barrier at Gambarri on the Ibadan Road and a similar system is worked on the Abeokuta Road near Abeokuta.

The total number of cases reported from Ijebu-Ode Province is as follows :—

Village.	Population.	Cases.	Deaths.
Ode	3,759	45	36
Ijebu-Ode	21,950	442	393
Shagamu	9,694	33	25
Iperu	8,849	52	41
Ilara	192	5	2
Ogere	2,878	9	8
Eshure	429	5	4
Oru	4,891	37	34
Ago	7,014	94	86
Ijebu-Igbo	26,118	24	21
Ilishan	2,817	3	3
Idowa	844	13	13
Osasa	2,119	40	33
Okun	2,657	2	2
Oke Eri	698	16	14
Ikene	3,124	5	5
Owu	748	8	7
Total		833	727

The largest number of cases occurred in September when 123 were reported from Ijebu-Ode town alone. The numbers then fell gradually until the end of the year.

Rat destruction was carried out in the different villages and positive rats were reported from Ijebu-Ode, Osasa, Owo, Idowa, Ago and Oru.

Deratting and disinfection has been commenced at Ijebu-Ode town, Iperu and Ijebu-Igbo.

Abeokuta.—Nine cases of plague were reported from Abeokuta during the year. They were all of the pneumonic type. There was no suggestion of a wide spread epidemic. Rat examination for plague infection was carried out; only one positive rat was discovered. Investigation was also made into bush rodent infection at Owode in the Abeokuta Province, but no infection was reported.

W. ALLAN,
Senior Sanitary Officer.

1926

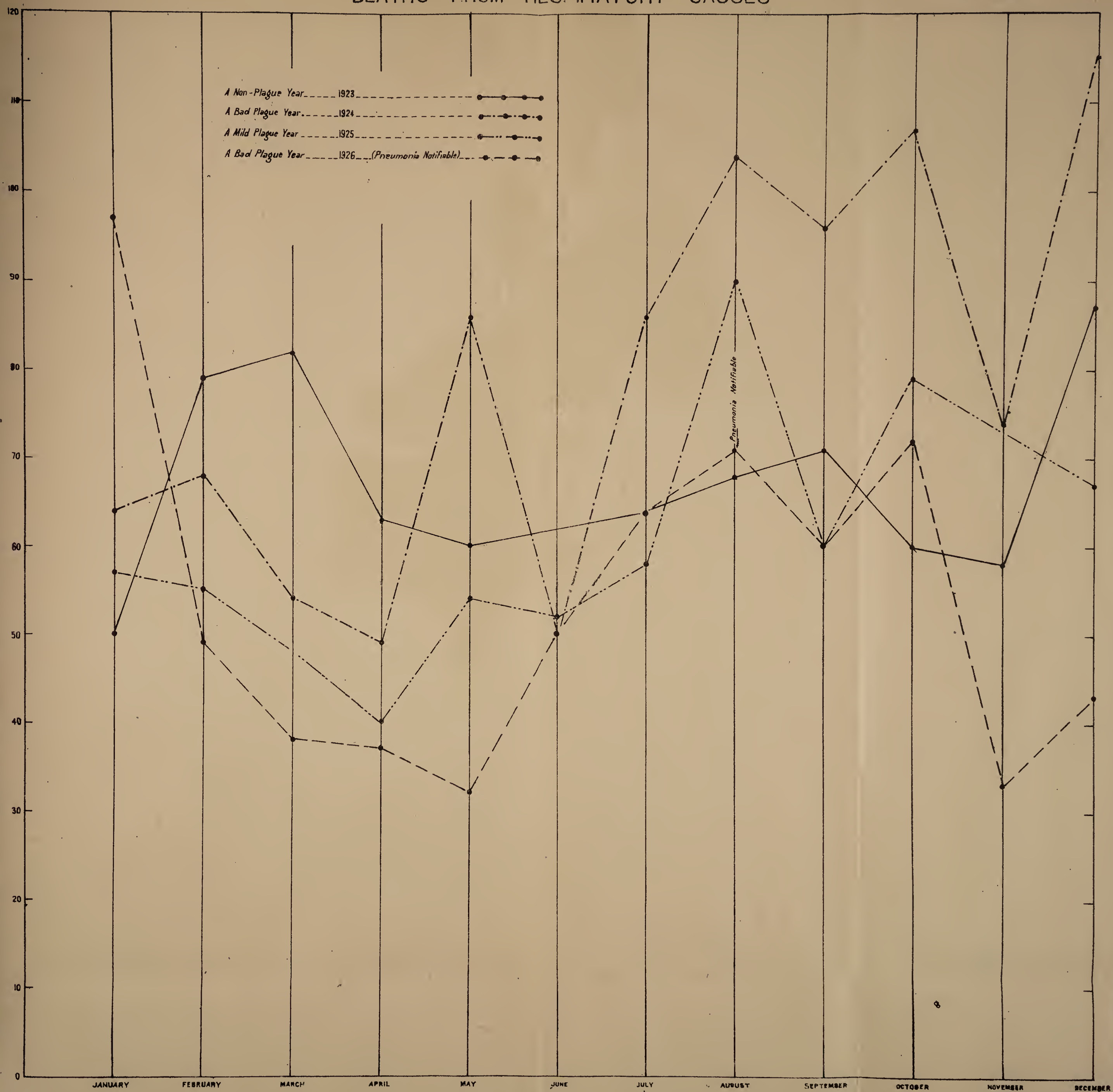


Malaria (Europeans & Natives) Percentage Distribution of 948 Cases.-----●-----●-----●

Lagos Rainfall Percentage Distribution of the total fall (75 Inches).-----●-----●-----●

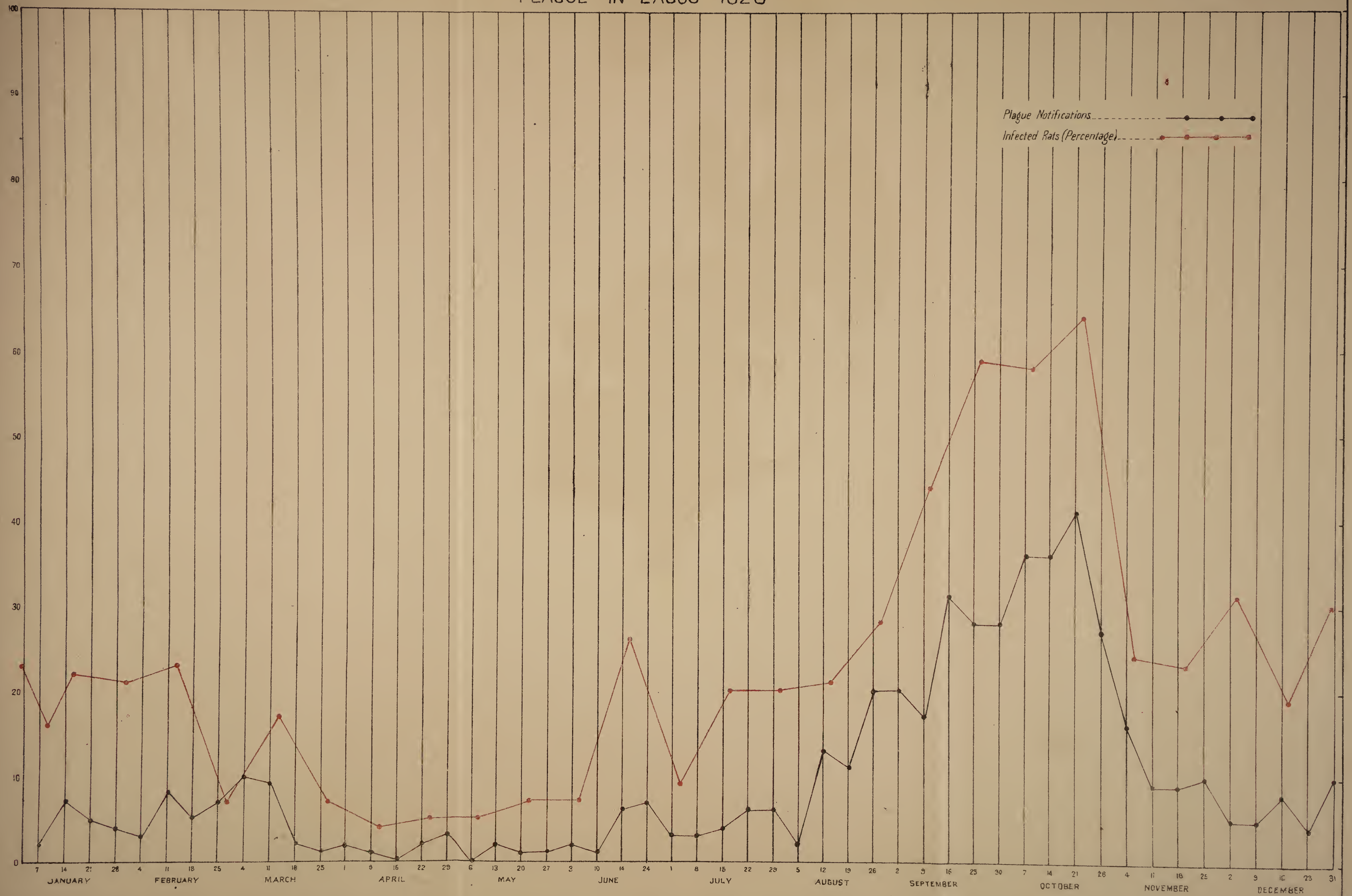
DEATHS FROM RESPIRATORY CAUSES

CHART Nº1



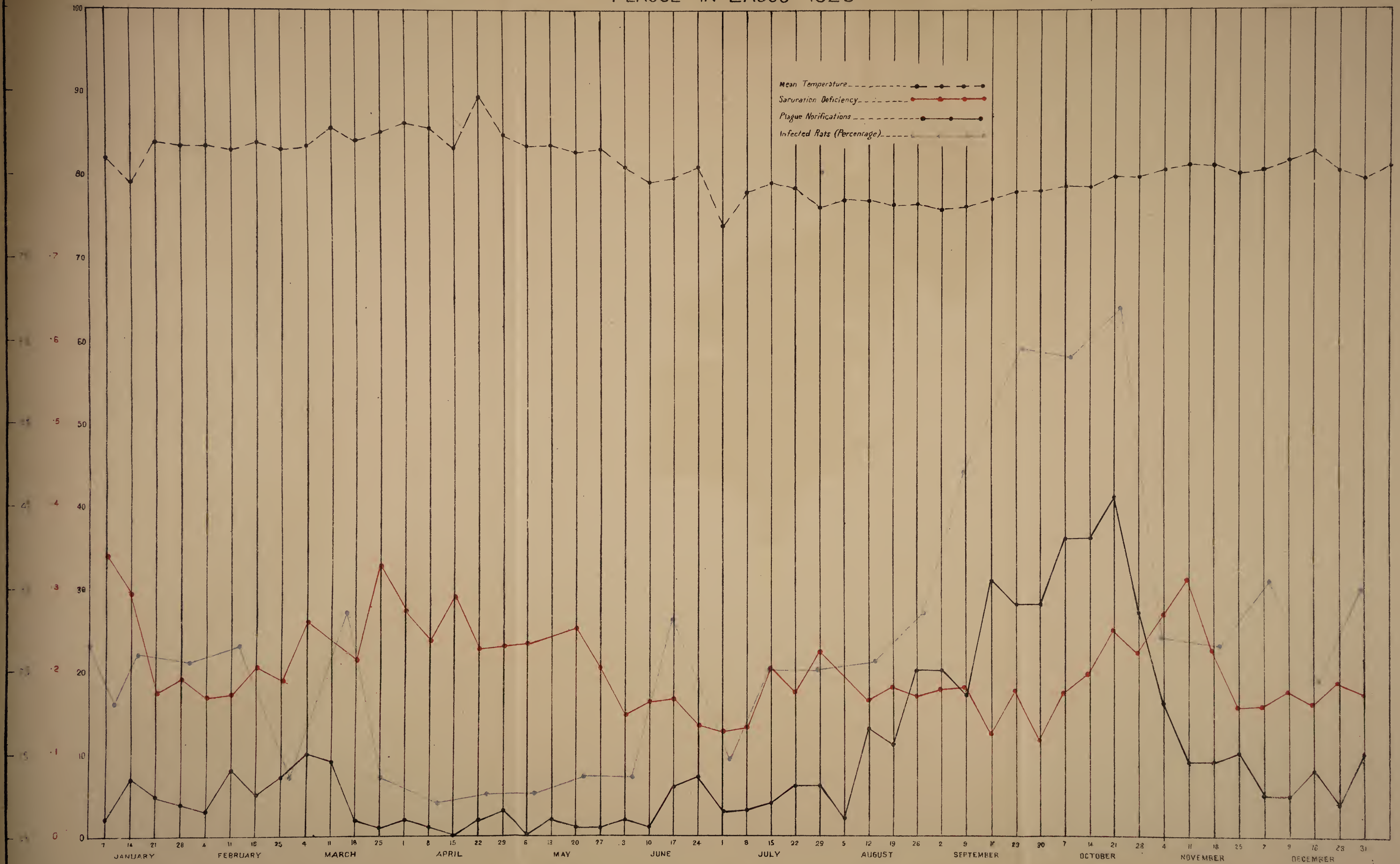
PLAGUE IN LAGOS 1926

CHART No2



PLAGUE IN LAGOS 1926

CHART NO3



APPENDIX F.

ANNUAL REPORT OF THE GOVERNMENT ANALYST

BY

A. B. HOBSON.

REPORT OF THE GOVERNMENT ANALYST.

The six months working period covered by this report dated from 6th February, 1926, to 13th August, 1926, when the Analyst departed on leave after an eighteen months' tour of service.

During this period the number of samples received for examination was 209. Their classification was as follows:—

Waters and aerated waters	...	...	...	79
Beer, wines, spirits, and other beverages	...	...	...	10
Pharmaceutical preparations	...	...	...	32
Perfumes	...	...	...	3
Foodstuffs	...	...	...	1
Toxicological and stains	...	...	...	30
Miscellaneous police	...	...	...	14
Chemicals and drugs	...	...	...	8
Soils (in connection with corrosion)	...	...	...	13
Salivary gland calculi	...	...	...	2
Telephone cable	...	...	...	2
Mineral deposits	...	...	...	2
Native liquors	...	...	...	4
Miscellaneous	...	...	...	9
Total				209

WATER.

LAGOS SUPPLY.

The analytical data obtained showed the usual marked increase in colour and vegetable organic matter, after rains.

Experiments made for the Public Works Department, with a view to further purification of the Iju water, did not indicate that an aeration process was likely to give much improvement in colour. It should be remembered that the deep brown colour, and sediments, sometimes experienced in Lagos, are due to local main and service pipe conditions.

The following data obtained in July, 1926, will illustrate the above variations.

	Acidity (as free CO ₂) parts per 100,000.	Iron.
1. Source, Iju	1·3	0·13
2. Settled Water, Iju	0·66	0·008
3. Filtered Water, Iju	0·66	0·006
4. Moloney Street Bridge, scour discharge after few minutes flushing dead end of main	0·66	0·08
5. Magazine Point scour pipe discharge without flushing dead end of the main	0·88	1·5
6. Tap Water, Glover Road, Ikoyi	0·55	0·02
7. Ijora, scour pipe discharge at dead end before flushing	2·64	Large deposits of iron oxide.
8. Ijora, after flushing	0·33	Negligible trace.

A further clarification and purification of Iju water would be obtained by the use of 0·5 grain per gallon of aluminium sulphate and the necessary amount of carbonate of soda.

The time taken for precipitation would be about forty hours.

KANO.

A considerable amount of information was obtained during the year as to the nature and best line of dealing with the Challowa River water. The latter is essentially a product of surface drainage, and at present is seriously polluted. However, there is some hope that with a scheme of aeration and filtration, a satisfactory supply can be obtained.

A specimen of a white saline deposit from the dry Challowa River bed, proved to be of similar composition to the Egyptian "natron."

Analysis of the specimen forwarded (mixed with sand), showed an alkality equivalent to 27.6 *per cent.*, expressed as anhydrous sodium carbonate.

KADUNA.

The aluminium sulphate coagulation scheme appears to be working satisfactorily. Occasional samples have been received which have shown a small amount of "flock," but the treated water is of fair purity.

BENIN.

This supply had a very deep yellow colour, and it was a matter of some interest to investigate the cause. Three samples were obtained, one each from the well at the source, the reservoir, service pipe, and a house tap, in the Medical Officer's quarters. They gave the following analytical data:—

					Acidity as free CO_2	Dissolved Oxygen in 100cc.	Iron remain- ing in solution p.p. 100,000.
Source	...	...	...	...	1.87	0.3	0.005
Reservoir	...	...	...	...	2.43	0.53	0.042
M.O.'s Quarters	...	...	...	...	1.87	0.13	0.4

Even from the relative colour of the samples it was obvious that the bulk of the iron deposited and in solution was picked up between the reservoir and the house; it was concluded that the service pipes were seriously corroded, and that a certain amount of action was taking place in the main pipe also.

For the general analytical figures of the above supplies and those of Oyo, Jos, Ilorin, *see* Table I.

CORROSION.

The majority of waters in Nigeria are distinctly acid and this acidity is responsible for a considerable amount of damage where such waters are used for steam raising purposes, as on the Eastern Railway; or where they have the opportunity of acting for long periods on any metal as in the case of galvanised water pipes, pump parts, or telephone and electric light cables.

The only remedy in all cases is some form of neutralisation treatment adapted to the water concerned, or a definite protection of exposed metal from contact with the water.

On the Eastern Railway line samples of water were obtained from the supplies at Nomeh, Ameki, Afikpo Road, Aba, Imo River and Enugu (Ngwo supply), and also from engines 312, 315, 726 operating in this section.

Briefly the analyses indicated that it was hardly likely that the engine corrosion was due to decomposition in the boilers, of lime and magnesia salts, as had been previously suggested from home. The waters were all very soft (with exception of the sample from engine 312) and the amounts of lime and magnesia present were negligible. In the case of engines 315 and 726 the boiler concentrations of mineral salts were what would be expected from analyses of the water supplies, and only in engine 312 was the concentration high enough to become a factor in corrosion, and that because the boiler had not been cleaned out for some weeks.

A soda ash addition was recommended in the following quantities per gallon.

						lbs. anhydrous sodium carbonate per gallon.
Nomah	...	...	...	...	...	0.053
Ameki	...	...	...	...	...	0.53
Afikpo Road	...	...	...	...	...	0.58
Aba	...	...	...	...	...	0.42
Imo River	...	...	...	...	...	0.32
Enugu (Ngwo)	...	...	...	...	...	0.07

The quantities being calculated from the respective acidities.

It is extremely doubtful whether the Nomah and Enugu waters could have caused corrosion.

The above treatment has given very satisfactory results, and coupled with regular boiler cleaning, should eliminate engine corrosion in the section.

Another serious case of corrosion was found in the Ikoyi telephone cable where the lead sheathing was found to be seriously pitted. From an inspection of the corroded cable it was decided that the corrosion was due to chemical action. No sign of corrosion was observed on the bitumened steel ribbon forming the armour of the cable, which had remained almost as new. The "pittings" were found practically to coincide with the joint made by the edges of the steel ribbon armour. A series of five consecutive pittings on one specimen were almost exactly one inch apart (the width of the steel ribbon).

Further the angles made by the major axes of the "pittings" with the horizontal, coincided with the fact that the cable armouring is wound from left to right.

The above was all consistent with chemical action, a galvanic action would not be so localised.

Again, the chemical action could only be due to water. Only a liquid could have penetrated through the bitumened wrapping and the armour joint. The water might be corrosive of itself or dissolve out from the soil in the immediate neighbourhood the wherewithal to become corrosive.

Samples of soil were taken at various stages of the cable, and extracted with cold distilled water, and the relative acidities roughly determined. The amounts of soil taken were a cigarette tinful (about 290 grammes) in each case so that the results were comparable.

The amounts of N/10 sodium carbonate required for neutralisation varied from 0.10 c.c. to 0.81 c.c., the latter in the case of the sample taken in Obalende Road 2,387 yards.

An estimation of the acidity of the Obalende swamp water showed that it was equivalent to 5.1 p.p. 100.000 free carbonic acid gas, and the dissolved oxygen 0.16 p.p. 100.000.

From a general consideration of the results there was no doubt that erosion of the lead cable sheathing was due to acid water. The earth in which the cable was buried in Obalende Road was much wetter and of much higher acidity than the earth from other points on the cable.

The white deposits in the cable "pittings" proved to consist of basic lead carbonate. Oxygen is necessary to erosion, and it has access, as has the water, through the armour joints, and all corrosion will commence at those joints.

To protect the cable from the action of the water it is now boxed in bitumen, and this should preserve *new* cable.

Messrs. Riley & Harbord, Consultants, do not believe it will save the present cable, but it should at any rate prolong its life.

These cases of corrosion have been dealt with fairly fully, as the problem is a serious one in Nigeria. Recently it has been found that the Lagos electric cables are also corroded; one specimen has been received which has never been off the drum.

TOXICOLOGICAL AND STAINS.

In an interesting case of poisoning the symptoms and evidence observed by the Pathologist, Lagos Hospital, were those associated in Jamaica with "Ackee" poisoning. This fruit is known locally as "Ishin." An examination of the fruit indicated that the chief danger lies in the unripe fruit, of which the container is covered with a gummy sap. Anyone biting such a fruit to open could not fail to receive a considerable amount of this viscous gummy sap, possibly enough for a poisonous dose.

By making a slit in the fruit rind, a supply of the sap may be squeezed out of the unripe fruit. A drop of the sap gave the following reaction with a drop of concentrated sulphuric acid, when rubbed in a small porcelain dish with a glass rod:—

Yellow—red—maroon—purple—cambridge-blue—(after some time)—olive-green on dilution.

Three drops of the sap killed a guinea-pig in half-an-hour and it seems to contain a DIGIT-SAPONIN.

In the ripe open fruit this sap has hardened, probably by oxidation and does not appear to be poisonous. In any case it would not be easy to separate accidentally from the rind.

In another case where a poisonous substance was definitely isolated, a purple residue was obtained which struck a blood-red colour with alcohol. Fed to a guinea-pig the latter died in half-an-hour.

Eight specimens have been received for the detection of blood, six gave positive reactions.

POLICE.

Most of the specimens submitted were in connection with counterfeit coining.

Prisoners are still found in possession of cyanides and sulphocyanides, so essential for the silvering and gilding.

The following analyses show the various metallic alloys employed, and that there is no definite alloy used for the purpose.

Alleged Florin.				Alleged Shilling.	Alleged Shill.
Tin ...	...	...	97·1%	85·9%	—
Copper	...	...	1·6%	Trace	66·5%
Zinc...	...	...	1·3%	13·8%	32·5%
Silver	...	...	Trace	---	Insoluble in nitric acid (tin, etc.) by difference. 1·0
<hr/> 100·0%				<hr/> 99·7%	<hr/> 100·0%

The absence of lead is worth remark. Scrap brass, bronze, white metal, etc., is probably the raw material employed.

GENERAL.

Two *salivary gland calculi* proved to be phosphatic and probably of bacterial origin.

Two samples of soap lyes neutralised and unneutralised originating from the West African Soap Works, Apapa, were analysed with a view to the possibility of the unneutralised lye being run directly into the lagoon.

The Lagos Town Council was notified that it was not considered necessary to enforce neutralisation before disposal.

TABLE I.

Date.	Nitrogen as		Nitrite.	Nitrate.	Oxygen absorbed 4 hrs. lab. temp.	Total Solids.	Total Hardness.	Chlorine.	Remarks.
	Saline Ammonia.	Albuminoid Ammonia.							
LAGOS.									
28th January, 1926.	Source, Iju	Nil	Nil	0.054	0.127	3.3	0.5	0.85	
"	Effluent, Iju	"	"	0.06	0.064	3.3	0.5	0.85	
22nd February, 1926.	Yaba Tap	"	"	—	0.275	—	—	—	
25th "	Source, Iju	"	"	—	0.281	3.6	0.5	0.85	
"	Effluent, Iju	"	"	—	0.180	3.5	0.5	0.85	
25th March, 1926.	Source, Iju	"	"	—	0.201	4.0	0.5	0.8	
"	Effluent, Iju	"	"	—	0.108	3.6	0.5	0.8	
5th May, 1926.	Yaba Tap	"	—	—	0.215	—	—	—	
8th "	Source, Iju	"	Nil	—	0.611	4.9	0.5	0.9	
10th "	Yaba Tap	"	"	—	0.171	3.6	0.9	1.0	
KANO (CHALLOWA RIVER).									
28th April, 1926.	Well Water	0.053	"	0.19	0.077	—	6.0	0.5	Large deposit iron, etc. Aeration indicated.
"	Borehole Water	0.090	"	0.28	0.300	—	5.5	1.0	
29th "	No. 2	0.0005	"	—	0.057	12.7	5.0	0.4	
"	No. 2A	0.088	"	—	0.301	20.2	5.0	0.5	
3rd May, 1926.	No. 3	0.055	"	—	0.063	12.5	5.0	0.5	
"	No. 3A	0.066	"	—	0.200	18.7	5.0	0.5	
6th "	No. 4	0.048	"	0.25	0.014	12.4	5.0	0.4	
"	No. 4A	0.073	"	0.15	0.259	19.4	5.0	0.5	
"	No. 5	0.017	"	—	0.441	259.2	3.0	0.4	
May 1926.	No. 5A	0.036	"	—	0.325	18.4	4.5	0.6	
"						after filtration in suspension 12.00- 6.4			
27th May, 1926.	No. 6	0.012	,	—	0.39	185.2	1.0	0.4	River 4' 6" above lowest dry season level.

TABLE I—Continued.

Date.	Nitrogen as		Nitrite.	Nitrate.	Oxygen absorbed 4 hrs. lab. temp.	Total Solids.	Total Hardness.	Chlorine.	Remarks.
	Saline Ammonia.	Albuminoid Ammonia.							
KADUNA (GULMA RIVER).									
15th February, 1926.	River ...	Nil	Nil	—	0·036	9·0	2·0	0·3	Ph. 73.
"	Hospital Tap	0·0036	"	—	0·024	8·8	2·0	0·35	
March, 1926.	Gulma River 1	0·0094	"	0·6	0·061	9·0	2·5	0·45 Iron	0·12 PH. 75.
"	" 2	0·0071	"	1·2	0·073	10·8	2·5	0·45	0·10.
17th April, 1926.	Kaduna Intake	Nil	"	—	0·037	7·7	2·0	0·3	
3rd May, 1926.	"	0·0056	"	—	0·182	26·6	1·0	0·4	PH. 65.
"	Hospital	Nil	"	—	0·066	11·6	—	—	" 75.
20th	" Intake	0·016	"	—	0·013	23·9	1·0	0·2	" 73.
"	Hospital	0·0050	"	—	0·0031	12·8	2·0	0·2	" 77.
June, 1926.	" Intake	0·0008	"	—	0·182	57·2	0·5	0·2	
ILORIN.									
River Asa ...	...	Nil	"	0·8	0·222	11·1	2·0	0·2	Acidity (as free Co ₂) 0·4.
" Alalubosa ...	...	0·0010	"	0·7	0·039	8·0	2·0	0·2	" " 0·4.
OYO.									
7th July, 1926.	Residency W.	0·0017	"	0·7	0·050	13·7	7·0	0·5	Acidity 4·2.
"	Durbar Pool	Trace	"	1·0	(More than 0·4 see iron)	11·6	2·0	0·6	Iron 0·6. Acidity 2·4.
JOS.									
River ...	...	0·0025	"	0·3	0·008	44·3	1·0	0·2	
LJEBU-ODE.									
March, 1926.	No. 1	Trace	—	—	0·083	—	—	—	Samples insufficient for full analysis.
"	No. 2	"	—	—	0·122	—	—	—	

